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Israel Exploration Journal

VOLUME 2 * NUMBER 3

JERUSALEM, ISRAEL * 1952

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ISRAEL EXPLORATION JOURNAL

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BUSINESS CORRESPONDENCE: to Israel Exploration Journal, P.O.B. 1406, Jerusalem, Israel.

PAPERS FOR PUBLICATION (typewritten in English or French): to Prof. A. REIFENBERG, Hebrew University, Jerusalem, Israel.

BOOKS FOR REVIEW: to Mr. M. AVI-YONAH, Department of Antiquities, P.O.B. 586, Jerusalem, Israel.

THIS JOURNAL *is non-political and seeks only to further the pursuit of knowledge. Its main purpose is to communicate to scholars abroad the results of scientific investigations of the Near East as carried out in Israel. But as fruitful work can be accomplished only by reciprocal endeavour, papers from contributors in other countries will be gladly considered. The subjects to be dealt with include the history, archaeology and culture of the countries of the Near East, as well as their geography and natural features.—The Editors are not responsible for the opinions expressed by contributors.*

Israel Exploration Journal

VOLUME 2 NUMBER 3 1952

The Buried Structure of Rosh ha-'Ayin in the Central Coastal Plain of Israel

A. and E. LOEHNBERG

INTRODUCTION

A STRUCTURAL uplift buried under a cover of Quaternary to Upper Cretaceous formations has been discovered through geo-electric measurements in the Rosh ha-'Ayin—Petah Tiqva area. Together with the adjoining 'Bay of Magdiel' and the 'Tsofit Uplift' this 'Rosh ha-'Ayin Structure' represents the dominant structural feature of the subsoil in the central coastal plain.

The gradual elucidation of the submerged topography in this region has not been the result of a single regional geophysical survey but of 32 investigations which were carried out for the purpose of water supply and extended—with interruptions—over a period of 18 years.

The exploitation of ground water which has become more and more systematic since the establishment of the State of Israel provided the incentive to combine the mosaic of individual geophysical measurements into a more coherent pattern of subsoil conditions. To give a short report on the present state of our knowledge is the object of this paper.

The aim of the investigations, on the results of which this article is based, was the search for ground water in the limestones and dolomites of the Cretaceous Turonian-Cenomanian formations. The geophysical problem posed by this task consisted in determining the thickness of two 'cover' layers: (i) the unconsolidated and semi-consolidated deposits of loam, sand and sandstone of Alluvial to Pliocene age (up to 150 m. thickness); (ii) the soft to semi-hard strata

consisting of clay, marl, chalk, flinty limestone, shale and limestone of Pliocene to Senonian age, the thickness of which ranges from several tens to many hundreds of metres and reaches more than 1000 m. in the basins.

The boundary between the second complex and the underlying harder but more porous 'productive' limestones and dolomites is marked geo-electrically by a rise from low or medium resistivities to medium-high and high values. The determination of this boundary was solved satisfactorily for the first time in 1934 at Ramat ha-Kovesh, where a bore-hole had penetrated the upper horizon of the coastal plain (sand, sandstone) to about 140 m. depth without encountering significant water-bearing layers. When a geo-electric test was made at this stage, indications of the existence of a second water horizon were found, and subsequently confirmed, by deepening the bore-hole to 158 m. depth. Although ground-water from this Turonian-Cenomanian horizon had been drawn in the coastal plain from a few 'accidentally' successful wells before 1934, the geo-electric survey at the Ramat ha-Kovesh bore marked the beginning of a systematic prospecting campaign for the exploitation of the second and deeper horizon of the country's subsoil water reserves. Within the area covered by the accompanying map (fig. 1, p. 149) there are now about 30 bore-holes which have entered the second water horizon and yield large quantities of water used for domestic, industrial and agricultural purposes.

GEO-ELECTRIC MEASUREMENTS

The geo-electric measurements referred to in this article consist of determinations of the resistivity of the subsoil made with the standard 4-point Wenner electrode configuration. Diagrams showing the apparent resistivity of the subsoil in relation to the penetration depth of an artificially created electric field are subjected to mathematic-graphic treatment.[1] This results in an electric log consisting of calculated 'absolute' resistivities at each measuring site, which permits the determination of the thickness and geophysical characteristics of the main formations. The mathematic procedures as improved in the course of the last years and the instrumentation problems for electric measurements to great depth will be the subject of separate publications and are, therefore, not discussed here. It should only be noted that the maximum depth reached by electric measurements in the area under discussion is 1200 m., and by bore-holes 515 m.

[1] Loehnberg, A. & Loewenstein, A.: Die geoelektrische Hydrologie als Teilgebiet der Analyse des Untergrundes, *Beitr. z. angewandten Geophysik*, 6, 1936, pp. 52-88.

(Kefar Sava East). Correlation between geo-electric and bore-hole data, as well as the consistency of geophysical characteristics for the main subsoil complexes, leave little doubt as to the general correctness of the contour lines indicating the surface of the Turonian-Cenomanian formation.

The contours are referred to sea-level and drawn at intervals of 100 m. In addition, the map shows the western edge of the Turonian-Cenomanian outcrops, which lies topographically between about 50-90 m. above sea-level. The position of the outcrops has been drawn on the basis of (i) Avnimelech-Picard's Sketch Map of the Central Coastal Plain,[2] appr. scale 1:217.000, 1937; (ii) Blake's Geological Map of Palestine (North), 1:250.000, 1939; (iii) Topographical Sheets of the Survey of Israel, 1:20.000, Et-Tira, Qalqilya, Majdal Yaba, Lydda.

The accuracy of the contour lines (fig. 1) is not uniform throughout: full lines represent inferences supported by the results of the 30 bore-holes mentioned above and by about 200 geo-electric measurements; broken lines indicate the inferences intra- and extrapolated mainly from geo-electric tests.

PREVIOUS CONCEPTS

Picard and Avnimelech[2] describe the structure of the area reviewed here as a synclinal fold or double-fold sinking westwards into the Mediterranean. From the present mountain border, explained as an abrasion coast of the Pliocene sea, the older formations are supposed to drop in a wave-like fashion into the deep Mediterranean trough. Two nearly parallel dislocations running N 10-12° E are assumed to carry the Turonian-Cenomanian block from its anticlinal position in the Judaean mountains into the structural basin of the coastal plain. The eastern hypothetic fault ('the Ramle line') runs from slightly west of Qalqilya through the Rosh ha-'Ayin springs to Lydda—Ramle—el Kheima; the western fault ('the Rehovot line') is placed west of Petah Tiqva, running from Ra'anana to Rehovot—Gedera.

Blake's Geological Map of Palestine also shows two parallel dislocations, an eastern one starting at Rosh ha-'Ayin and running slightly east of the Ramle line, and a western one, indicated only over a stretch of 5 km. on the western outskirts of Petah Tiqva.

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[2] Picard, L. & Avnimelech, M.: On the Geology of the Central Coastal Plain, *Journ. Palest. Orient. Soc.*, 17, 1937, pp. 255-299. Ref. Map, Pl. XII.

Blake-Goldschmidt,[3] by basing their geo-hydrological analysis of the Rosh ha-'Ayin area on a close interpretation of all available bore-hole information, have been able to add structural details to previous concepts. The monoclinal fold of the mountain border is shown to have developed a sharp fold at Kefar Sirkin, which causes the downthrow side to form a small anticlinal arch with its highest point east of Petah Tiqva. Slightly further west this arch has again been cut by a fault. In the area of Miske—Ramat ha-Kovesh a dome-like upwarping of the Turonian-Cenomanian formations below the sediments of the coastal plain was found.

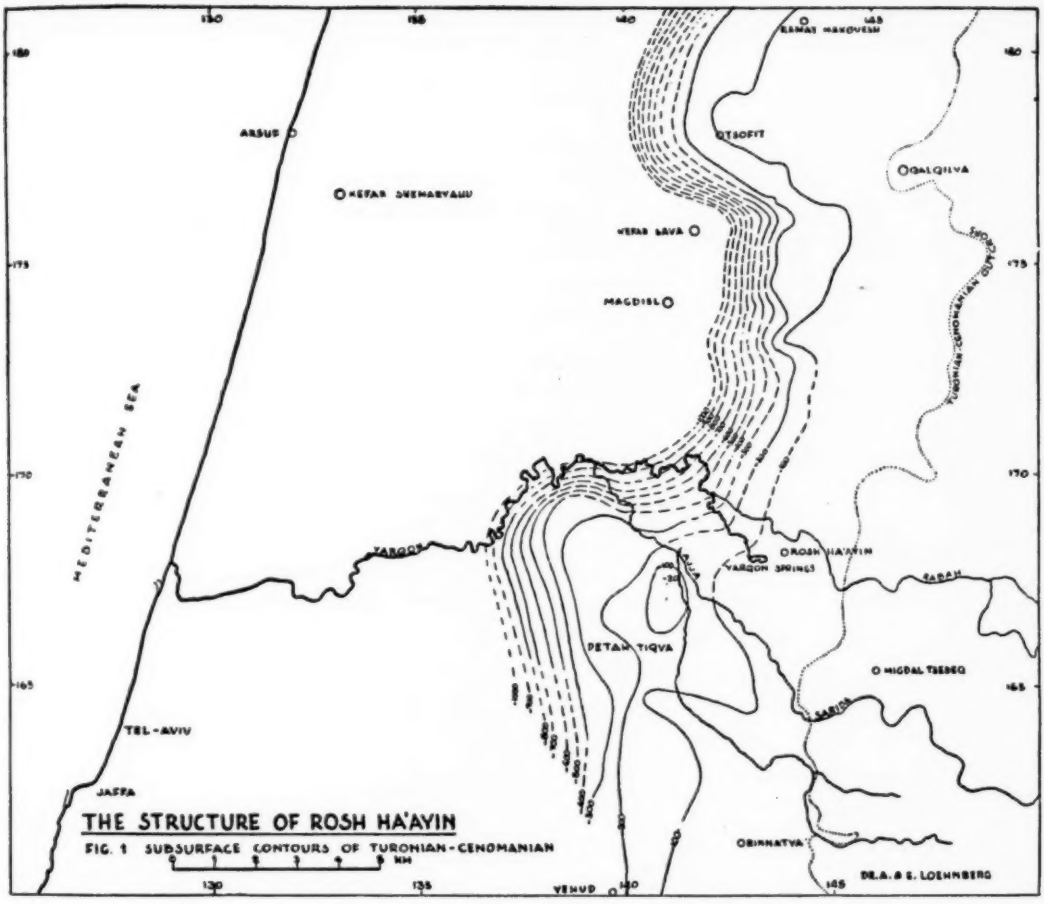
Amiran,[4] in his study of seismic phenomena in Palestine, comes to the conclusion that in order to explain the position of epicentres not only NNE lines should be regarded as the predominant structural feature of the central coastal plain, but that also NW-SE dislocations of probably not less tectonic importance have to be assumed.

Summarizing the results of hitherto published data on the structure of the central coastal plain one might state that the drop of the mountain formations into the Mediterranean basin was originally thought to occur along two parallel dislocations, running approximately NNE-SSW. The length, nature and exact position of these faults was largely unknown, but a genetic relation between the eastern fault and the appearance of the big Rosh ha-'Ayin springs was taken for granted. This at first relatively simple pattern became more complicated in the course of detailed examinations of the hydrology and of bore-hole data and on the basis of the results of seismic studies. NW-SE directed dislocations had to be assumed in order to explain centres of increased seismic activity, and the theory of a wave-like type of downward movement of the Turonian-Cenomanian formations had to be modified in the light of information on the existence of a dome-like structure near Miske—Ramat ha-Kovesh.

OUTLINE OF THE ROSH HA-'AYIN STRUCTURE AND OF ITS ENVIRONMENTS

The Rosh ha-'Ayin Structure (fig. 1) represents a sharply defined promontory of Turonian-Cenomanian limestones and dolomites jutting out into the central coastal plain in a north-westerly direction. Its axis runs from a point about

[3] Blake, G. S. & Goldschmidt, M. J.: *Geology and Water Resources of Palestine*, Jerusalem, 1947. Ref. pp. 228-247. [4] Amiran, D. H. K.: A revised Earthquake-Catalogue of Palestine, *Israel Explor. Journ.*, 2, 1952, pp. 48-65.



2 km. north of Rinnatya towards the eastern suburbs of Petah Tiqva into the north-western tip of the big Yarqon bend. The continuation of this axis passes through Herzlia-Kefar Shemaryahu and reaches the coast at the ancient harbour of Arsuf, where a slight bend in the course of the coast-line may indicate the possible continuation of the structure at a very great depth.

Sharp and steep cliffs surround the promontory on its western, north-western and northern sides; to the west along NNW-SSE lines on the western boundary of Petah Tiqva, to the north-west and north along lines parallel to the NE and E-W directed portions of the Yarqon bends. The north-eastern boundary of the structure is marked by the NW directed flow of the Yarqon from its outflow at Rosh ha-'Ayin to its first strong bend some 2.8 km. NW of the spring area.

The highest peaks in the northern part of the uplift reach to 20 m. below sea-level (about 40-50 m. below ground) in the neighbourhood of the Petah

Tiqva—Rosh ha-'Ayin—Lydda Airport—Haifa crossroads. The drop from here westwards over a distance of 2.5 km. is 300 m., but over a distance of 4 km. it is about 1000 m. From the highest elevation in the northern direction a drop of about 1000 m. is reached already at a distance of about 2.5 km. The sharp relief of the western, north-western and northern flanks suggests a 'horst-like' promontory, bounded probably by a hinge-fault on the north-eastern side, anchored at the spring area of Rosh ha-'Ayin.

North and north-north-east of the Yarqon-bend promontory extends a deep bay with Ramatayim-Magdiel-Kefar Malal in its centre and with a steeply plunging coastal fringe, connecting the eastern tip of the Yarqon bend with Byar Adas and the eastern part of Kefar Sava. This depression may be called the Magdiel Bay.

The northern and north-eastern boundary of the Magdiel Bay is formed by another promontory: the Tsofit Uplift which extends as a 6 km. broad shelf of Turonian-Cenomanian rocks (not more than 100 m. below sea level) from the Turonian outcrops north of Qalqilya in a westerly direction towards Tsofit.

If the gradient of the slopes surrounding the Magdiel Bay on its southern, eastern and northern sides is extrapolated into the central portion of the gulf (centre of Ramatayim), a depth of about 2500 m. below sea level would be reached. The rise of the surface of the Turonian from here to the (submerged) plateau of the Rosh ha-'Ayin structure some 6 km. further south would, therefore, amount to more than 2000 m., equivalent to a slope of approximately 20^0.

THE SIGNIFICANCE OF THE STRUCTURE

The delineation of the buried Turonian-Cenomanian relief in this region, which forms the hinterland of the most densely populated part of Israel, will facilitate the future location of water wells. In addition, it has now become possible to define with greater exactness the subsoil drainage area of the Rosh ha-'Ayin springs and structural conditions suitable for the possible accumulation of oil.

As far as the area of the central coastal plain is concerned, the concept of a single or double wave-like monocline dropping along one or two parallel NE-SW faults into the Mediterranean basin will have to be substantially modified. Instead, we have to assume a more complicated structural pattern, consisting of shelves of irregular width with steep coast-lines, and of the Magdiel Bay, bordered in the north by the Tsofit Uplift and in the south by the Rosh ha-'Ayin Structure. Lines of dislocation appear to be determined only to a minor

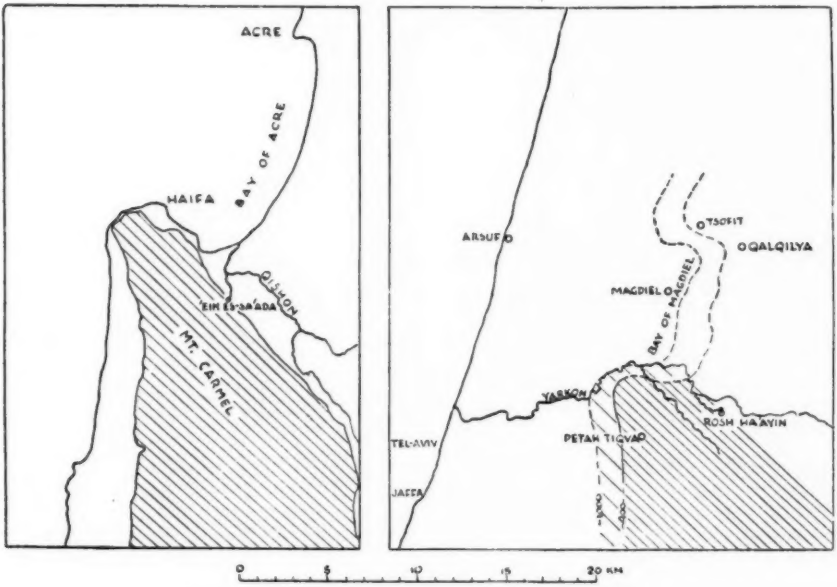


Fig. 2. The Structure of the Carmel and Rosh ha-'Ayin.
Dr. A. and E. Loehnberg

degree by NE faults, and greater attention must be given to NNW to NW or even to E-W tectonic disturbances.

A geological explanation can now be given for the hitherto unexplained large northward bend of the Yarqon between Rosh ha-'Ayin and the north-western outskirts of Petah Tiqva. This bend marks an ancient river course which had to flow around the promontory of the Rosh ha-'Ayin Structure in order to reach the sea in the west. The wadi system of Wadi es-Sarar and Wadi el-Lajja, too, has been diverted from its straight east-west course (as indicated by its upper reaches: Wadi es-Sarar—Wadi Musmar—Wadi Sarida) into a north-western direction by the Rosh ha-'Ayin Structure, a phenomenon similar to the NW-diversion of the Yarqon between the springs and the most north-easterly point as seen from the ancient Yarqon course extending eastwards from Rosh ha-'Ayin into the system of Wadi Rabah.

The shape, size and north-west directed axis of the Rosh ha-'Ayin Structure bear a striking resemblance to the northern portion of the Carmel block (fig. 2); the Carmel-type arrangement repeats itself in the area of Petah Tiqva—Magdiel—Tsofit. The Carmel massif between Yagur—'Ein Haud—Haifa might

be compared with the Rosh ha-'Ayin Structure between Migdal Tsedeq—Yehud —Yarqon-bend; the Haifa Bay with the Magdiel Bay, and the Tsofit Uplift with the Acre promontory, and parallels might be drawn between parts of the Qishon and Yarqon courses and between the Rosh ha-'Ayin and the 'Ein es-Sa'ada springs.

ACKNOWLEDGEMENTS: The authors' gratitude is due to the following organisations and individuals whose co-operation enabled them to carry out the numerous surveys, on which this paper is based:

Municipalities: Tel-Aviv and Petah Tiqva.

Settlements: Ramat ha-Kovesh, Tsofit, Kefar Malal, Magdiel, Sede Warburg.

Organisations: Water Department, Ministry of Agriculture, State of Israel; Chief Engineer, British Middle East Forces; Settlement Department of the Jewish Agency; Rassco Ltd.

Water Companies: Mekoroth, Water Company Ltd.; Palestine Water Company Ltd.; Kefar Sava Water Works.

Landowners: Messrs. Shamrot, Gan ha-Sharon; Turkenitz, Tel Asher.

Engineers and Geologists: Messrs. J. Fohs; A. Katz; M. T. Kozary; Knappen Tippetts Abbett McCarthy Engineers; V. Salkind; A. Wiener; M. Wotzasek.

Collaborators: A. Loewenstein; L. Gal-Ed; N. Altmann; I. Gluek; W. Deutsch; A. Schick; Sh. Tuchler.

Evaporation from the Red Sea*

J. NEUMANN

Israel Meteorological Service

The following paper presents the results of some of the energy-balance calculations carried out by the Meteorological Service of Israel.

THIS note sums up the results of computations of the energy-balance and evaporation for the Red Sea. Up to the present the only published information relevant to the subject[1] has been Vercelli's estimate[2] of an annual evaporation amounting to 350 cm. However, Vercelli's estimate was based on pan observations of coastal stations.

Detailed energy-balance computations for an area of the Red Sea (25° N, 35° E) lead to the following results:

(a) Mean annual evaporation is about 210 cm.;

(b) Mean daily evaporation is 0.4 cm. in February and 0.8 cm. in August;

(c) Mean evaporation between 15 February and 15 August is about the same as, or even slightly *less*, than between 15 August and 15 February;

(d) The sea has a net annual gain of sensible heat from the atmosphere;

(e) The amount of heat entering into storage in the sea between February and August and leaving the sea during the remainder of the annual cycle is 17,600 gcal/cm². This amount is small, in agreement with the known small annual range of sea temperatures.

Computations for the Gulf of 'Aqaba in the north of the Red Sea yield an average annual evaporation of 200 cm. Estimates are made of the energy-balance of and evaporation from the southern Red Sea. The tentative results indicate an increase southward of the evaporation from about 200 cm. at 29° N (Gulf of 'Aqaba) to about 235 cm. at 15° N.

The contribution of the Red Sea towards the world-wide balance of the quantity (evaporation minus precipitation) is estimated at 210 cm. per annum.

1. METHOD OF CALCULATION

MONTHLY transmission coefficients of insolation for a cloudless atmosphere free of solid and liquid particles have been computed from Kimball's appro-

* The writer is indebted to Messrs. M. Gilead and N. Rosenan for their interest and assistance in the work summarized in this paper. He also thanks members of the Research Section of the Israel Meteorological Service for their help with the computations.

[1] This statement appears to be correct at least up to 1950.

[2] Sverdrup, H. U., Johnson, M.W. & Fleming, R. H.: *The Oceans*, New York, 1942. Ref. pp. 689-690.

priate chart.[3] In this it was assumed that the amount of precipitable water w in the atmosphere is given by Hann's equation $w = 0.1725\ e$ where w is in cm. and e is the vapour pressure of the air in mb. Although Hann's coefficient is in all probability subject to an annual variation, a small variation of the coefficient such as found e.g. in the United States,[3] would hardly change the magnitude of the transmission coefficient as read off in the sector of Kimball's chart pertinent to the mean monthly solar air mass values corresponding to the latitudes of the Red Sea.

Next, assumptions had to be made in respect of the magnitude and annual variation of the total fraction of insolation depleted by solid particles such as sand, dust and salt, and possibly also by liquid particles suspended in the atmosphere. Unlike the case of energy-balance calculations for the oceans, account had to be taken of the fact that the Red Sea is a narrow and long water body flanked on both east and west by extensive desert-areas where dust depletion of insolation will be expected to be high. According to the British Admiralty's *Pilot of the Red Sea and of the Gulf of Aden*[4] 'sand and dust haze is widespread in June, July and August throughout the day'; over the northern part of the sea '...visibility is often reduced by haze, or by 'Khamsin' sandstorms which may give dense dust-fog from Suez to Daedalus reef'. Rainfall over the sea is infrequent and meagre and cannot be assumed to clear the atmosphere.

After various considerations, the following distribution of dust depletion d has been assumed for the purposes of the present calculations:

January	0.05	May	0.10	September	0.10
February	0.05	June	0.20	October	0.10
March	0.10	July	0.20	November	0.10
April	0.10	August	0.15	December	0.00

The annual mean of the above distribution is approximately 0.10, while for average desert conditions Klein[5] cites a value of 0.25.

Depletion of insolation by clouds has been obtained from Angström's formula

$$Q_s = Q_o\,(1 - 0.071\,c) \qquad (1)$$

where Q_o is the amount of insolation received at the surface after its depletion

[3] Klein, W.H.: Calculation of solar radiation and the solar heat load on man, *Journ. of Meteorol.*, 5, 1948, pp. 119-129. Ref. p. 120. [4] Admiralty, Hydrographic Department: *Red Sea and Gulf of Aden Pilot*, London, 9th ed., 1944. Ref. pp. 37, 39. [5] Klein, *op. cit.* (supra, n. 3), p. 123.

by a cloudless atmosphere while c is the mean cloud amount on the scale of 1 to 10. As usual, all energy components relate to a 1 cm^2 area of the sea.

In accordance with W. Schmidt's figures for the latitudes corresponding to the northern Red Sea, the fraction of Q_s reflected from the sea surface has been taken as 0.04. The effective back radiation Q_{bo} from the sea surface to a cloudless sky has been read from Sverdrup's relevant graph.[6] Finally, Q_{bo} was reduced by the formula

$$Q_b = Q_{bo}\,(1-0.083\,c) \qquad (2)$$

to find the amount of effective back radiation Q_b from the sea surface to a sky covered by c tenths of cloud.

2. METEOROLOGICAL DATA

All meteorological data, except those of atmospheric pressure, have been taken from the meteorological station maintained by the Physical Department of Egypt on the Daedalus reef at 24°55' N, 35°22' E. Located about 70 km. from the western coast of the sea, this coral reef, according to the British Admiralty *Pilot*,[7] '... sometimes dries during the low level period of this sea, but is always covered during the high level period; it is steep-to and may be passed on either side'. It would appear that the meteorological observations were taken in a single-louvred screen with a wire gauze in lieu of a door on the northern side ('Egyptian screen'). Details of exposure of the screen are not available, but it is noted that single-louvred screens are likely to lead to somewhat high daylight temperatures of the air and in consequence of this, to high reported daily mean values of that element. The mean diurnal temperature range is about 5°C which suggests a radiational influence on the temperature measurements in the screen. However, it should be borne in mind at the same time that the Red Sea is relatively narrow (about 240 km. wide at the latitude of the reef) and the bordering deserts with their large diurnal temperature oscillations are conducive to increase the range over the sea.

Monthly mean values of air temperature are locally available in published form for each of the years 1934-39[8] and 1946-47,[9] and from them monthly

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[6] Sverdrup, Johnson & Fleming, *op. cit.* (supra, n. 2). Ref. p. 111.

[7] *Red Sea... Pilot, op. cit.* (supra, n. 4), p. 120.

[8] Egypt, Ministry of Public Works, Physical Department, Cairo: *Meteorological Reports for the years 1934-39.*

[9] Egypt, Ministry of National Defence, Meteorological Department, Cairo: *Monthly values of certain meteorological elements at selected stations, 1946-47.*

TABLE I: METEOROLOGICAL DATA AND
ENERGY-BALANCE OF THE DAEDALUS REEF AREA (25° N, 35° E) OF THE RED SEA

T = temperature. c = cloudiness. Q_r = net radiative energy available for transfer to the sea or to the atmosphere.
e = vapour pressure. L = latent heat of vaporization. E = evaporation.
p = atmospheric pressure. R = Bowen's ratio.

Subscripts: w = water surface. a = air.

Month	T_w	T_a	e_w	e_a	$\frac{p}{1000+}$	c	L	R	$L(1+R)$	Q_r	E
	°C	°C	mb	mb	mb	1-10	gcal/g		gcal/g	gcal/cm²	cm
Jan.	23.3	22.0	28.1	17.5	16	3.0	585	0.076	629	5,550	
Feb.	22.7	21.6	27.2	17.3	15	2.7	585	0.069	625	7,100	11
Mar.	22.8	22.9	27.2	21.2	13	2.2	585	-0.010	579	10,000	
Apr.	23.9	24.8	29.1	23.9	11	2.1	584	-0.107	522	12,050	
May	25.6	27.3	32.2	27.2	09	2.3	583	-0.209	461	13,200	
June	27.2	28.4	35.4	29.2	07	0.8	582	-0.110	513	13,250	
July	28.4	29.8	38.0	30.9	05	1.1	582	-0.122	511	13,150	
Aug.	28.9	30.5	39.1	31.7	05	1.2	581	-0.133	504	12,700	24
Sep.	28.5	29.3	38.2	30.8	08	1.1	582	-0.067	543	11,350	
Oct.	27.6	28.0	36.2	29.7	12	1.5	582	-0.038	560	8,800	
Nov.	26.3	26.0	33.6	25.1	13	1.8	583	0.022	596	5,950	
Dec.	24.8	23.5	30.7	19.3	15	2.6	584	0.071	625	5,300	
Sum										118,800	
Mean	25.8	26.2	32.9	25.3	11	1.9	583	-0.033	564		

Notes:

Eannual = (118,800/564) cm = 211 cm.

1) $R = 0.61p\,(Tw - Ta)\,/\,(ew - ea) \cdot 10^3$.

2) $e_w = 0.98\,e_s$ where e_s is the vapour pressure over pure water of the same temperature as the sea of salinity 40 pro mille.

3) Values of L, R and of $L(1+R)$ in the row of mean values correspond to annual means of sea and air temperatures etc.

4) For sources and periods of meteorological data as well as for method of computation of energy-balance, see text.

means have been compiled for the combination of the above eight years. Mean values of relative humidity for each of the observation hours 08, 14 and 20 L.S.T. for the individual months constituting the above period are also available in the same publications and the average of the three observations was considered to give a good approximation of the true daily mean. Then, the mean monthly vapour pressures of the 8 years' period have been obtained from the mean vapour pressures computed from the mean temperatures and mean relative humidities of the individual months.

Mean values of cloudiness are available for each of the months of the years 1935-39[10] and the averages of these 5 years have been combined with published

[10] *Meteorological Reports, op. cit.* (supra, n. 8).

averages[11] of the 6 years 1929-34. It may be added that the monthly means of these two successive periods were either identical or differed by small amounts only.

Finally, monthly means of air pressure and of temperatures of the sea surface have been extracted from the *Monthly Meteorological Charts of the Indian Ocean,*[12] where the latter are given in °F. In converting the °F to °C, some monthly values have been changed by an amount not exceeding 0.2 °C in order to obtain a smooth annual curve.

3. THE RESULTS

The principal meteorological data on which the computations are founded as well as the monthly Bowen's ratios are given together with monthly values of the computed values of Q_r in Table I. Q_r represents the monthly amount of energy derived from radiative sources and available for transfer to the sea or to the atmosphere. $Q_r = 0.96\ Q_s - Q_b$ where the value of insolation Q_s has been reduced by 4 per cent to allow for reflection from the sea surface and as before, Q_b is the effective back radiation from the same.

The temperature difference sea surface minus air and therefore also Bowen's ratio are negative from March to October, i.e. for 8 months during which the sea gains sensible heat from the air. It is believed that few other sea areas will show a similarly long sequence of months during which energy in the form of sensible heat is transferred from the atmosphere to the sea. The positive values of Bowen's ratio R in winter are smaller and even much smaller than those found over many another oceanic or sea area. The sensible heat given up by the sea to the atmosphere in winter does not, therefore, compensate for the similar heat gained by the sea during the remainder of the year, and in consequence of this there is a net annual gain of sensible heat by the sea from the air. This net gain serves to increase evaporation from the sea. Since mean annual precipitation is less than 1 or 2 cm. over the northern sea, little sensible heat becomes available to the atmosphere from the transformation of latent heat. These conclusions are in accord with the observed rarity of storminess of the atmosphere over these waters.

For computing the amount of evaporation, it is assumed, as is done elsewhere, that the advective terms of the energy balance are negligible. Moreover

[11] Egypt, Ministry of Public Works, Physical Department: *Climatological Normals for Egypt and the Sudan, Cyprus and Palestine,* Cairo, 1938. [12] Meteorological Office, Marine Branch: *Monthly meteorological charts of the Indian Ocean,* London, 1944 (?).

for a mean annual cycle, the change in heat storage of the sea is nil. Thus one arrives in Table I at an annual evaporation of about 211 cm. According to Wüst, in the corresponding latitudes of the Atlantic and Pacific Oceans annual evaporation is 140 and 129 cm. respectively.

It is possible that the above result for the Red Sea is slightly high. A radiative error in the psychrometer reading in the single-louvred screen leads to relatively high numerical values of Bowen's ratio R and since R is certainly < 0 for a yearly period of the Daedalus area, an overestimation of the annual evaporation ensues. But even a 50 per cent error in the value of R stated in Table I would not entail an error greater than 2 per cent in the computed value of evaporation. A consideration of this and of other possible sources of error (assumed values of dust depletion, the value of the coefficient 0.071 in equation (1), etc.) can be summed up in the statement that the total possible error of the calculations is not greater than a few per cent.

4. CHECK OF THE VALUE OF EVAPORATION COMPUTED FROM THE ENERGY BALANCE OF THE SEA

The formula

$$E = 3.7\,(e_w - e_a)\,u \tag{3}$$

can be used to find approximately the annual amount of evaporation E, in cm., at mean wind velocities u of between 4 and 12 m/sec at 6 m. above sea surface[13] in which range falls also the average wind velocity of the Daedalus area. In equation (3) e_w is the average vapour pressure in mb of the sea surface and e_a is the average vapour pressure of the air, in similar units, measured 6 m. above the water level. The above formula which is a simplified form of a hydrodynamic equation, requires data which are either available or can be obtained by means of another equation developed by Sverdrup.

According to Sverdrup,[14] if the vapour pressure and the wind velocity are measured at a height of a cm. above sea surface, then the gradient of specific humidity to any height within the turbulent boundary layer is given by

$$\frac{dq}{dz} = -\frac{\Gamma_a}{z}(q_w - q_a) \tag{4}$$

where q is the specific humidity and the subscripts w and a refer to the sea surface and to the air at height a cm. respectively, z is height in cm. above sea

[13] Sverdrup, Johnson & Fleming, *op. cit.* (supra, n. 2), p. 120.

[14] Sverdrup, H.U.: The humidity gradient over the sea surface, *Journ. of Meteorol.*, 3, 1946, pp. 1-8.

surface and Γ_a is Montgomery's 'evaporation coefficient' appropriate to the prevailing stability conditions and to the magnitude of the average wind velocity at height a.

The average annual wind velocity reported by the station on the Daedalus reef is Beaufort force 2.9[15] which corresponds to about 4 m/sec. This velocity can be considered representative for the height at which the vapour pressure of the air is measured. Further, under average annual conditions of the Daedalus area, the temperature stratification is stable. From Sverdrup's diagram for stable conditions[16] and for a mean wind velocity of about 4 m/sec, $\Gamma_a = 0.15$. From Table I of the present paper one can compute the values of q_w and q_a and with $z = 600$ cm., it is found that $dq/dz = -1.2 \cdot 10^{-6}$ g/g of moist air/cm., and further that $q_{600} = 0.0132$ g/g of moist air, or $e_{600} = 21.4$ mb, so that

$$e_w - e_{600} = 11.5 \text{ mb.} \tag{5}$$

For the average wind velocity at 600 cm., data of ship observations compiled by the U.S. Weather Bureau[17] have been used. According to this source, east of 35°E over the Red Sea, the mean annual wind velocity in the area between 25° and 30° N is 10.2 knots while between 20° and 25° N it is 9.4 knots. Since Daedalus is located about 25° N, the average of the above two mean velocities is adopted which is 9.8 knots or 5.05 m/sec. Substituting the latter and equation (5) into equation (3) yields for E, the annual amount of evaporation, 215 cm. This approximate result is in good agreement with the figure obtained from energy-balance computations.

5. THE ANNUAL VARIATION OF EVAPORATION

In the absence of temperature soundings of the depths of the sea, the complete annual variation cannot be obtained by the energy-balance method. However, computations or estimates are possible for some selected shorter periods. Thus e. g. if it is assumed that February and August are the months when net changes of heat storage in the sea are negligible, it can be found from Table I that evaporation is about 11 cm. in February (0.4 cm. daily) and about 24 cm. in August (0.8 cm. daily).

The figure for February probably represents a minimum, or one of the minima, of the annual variation. This suggestion is supported by the consideration that

[15] *Climatological Normals, op. cit.* (supra, n. 11). [16] Sverdrup, *op. cit.* (supra, n. 14), fig. 4.
[17] U. S. Navy, Hydrographic Office: *Sailing directions for the Red Sea and the Gulf of Aden,* Washington, 1943. Ref. p. 498.

in Table I, Q_r in February is but slightly larger than in January, nor, in view of the small temperature change of the sea surface in February, can much heat be expected to become available for evaporation from the heat stored in the sea. In contrast, the relatively large cooling of the sea surface in January is in all likelihood an indicator of the release of an appreciable amount of heat from the sea, the greater part of which (over 90 per cent, according to Table I) is used up for evaporation.

Table I also encourages the conjecture that a second minimum of the annual variation occurs in June, probably in the first part of that month. Firstly, Q_r is only slightly greater for June than for May. Secondly, the rate of warming of the sea surface is still relatively large, especially at the beginning of the month, suggesting the diversion of heat for storage in the sea. Thirdly, the factor $L\,(1+R)$ is greater than in May.

The above considerations lend support to the conjecture that the annual variation is similar to the variation found in the middle latitudes of the oceans, i. e. it is of the double wave type. The two minima, as has been suggested above, occur probably in February and at the beginning of June. If this is true, then one maximum occurs between March and May. A second one probably develops not later than in September.

It can also be shown that slightly more water evaporates between August and February than between February and August or rather that the respective amounts of evaporation of both semesters are about the same. To show this, the only assumptions made are that the winter mean temperature minimum of a column of the Daedalus waters occurs on February 15, while the date of the summer mean temperature maximum of the same column is August 15. The amount of heat Q_b entering into storage in the sea during the first semester (February 15 to August 15) should be equal to the amount released from storage during the second semester. Now, if the symbol $'$ refer to the first semester and the symbol $''$ to the second semester, then

$$E=E'+E''=\frac{Q'_r-Q_b}{L'(1+R')}+\frac{Q''_r+Q_b}{L''(1+R'')}\,. \tag{6}$$

With the help of the data in Table I, it is found that

Q'_r	72,100 gcal/cm^2	Q''_r	46,700 gcal/cm^2
L'	583 gcal/g	L''	583 gcal/g
R'	-0.097	R''	0.031
$L'(1+R')$	526 gcal/g	$L''(1+R'')$	601 gcal/g

If these values are substituted in equation (6) and the latter is solved for Q_b, the following results are obtained:

$$Q_b = 17{,}600 \text{ gcal/cm}^2,$$

$$E' = 104 \text{ cm.}, \qquad E'' = 107 \text{ cm.},$$

these results being considered correct within about 10 per cent. Therefore, it may be said that evaporation in the semester August to February is about the same as and perhaps slightly greater than that in the remaining semester.

One other point of interest in the above discussion is the relatively low value found for Q_b. Similar computations carried out for the south-eastern Mediterranean yielded values about twice as great. The low value for the Red Sea is consistent with the small annual range of the temperature of its surface. The latter does not exceed about 6.5° C, whereas the corresponding value for the south-eastern Mediterranean is approximately 10 °C. The low value of Q_b also suggests that the annual range of mean daily evaporation is small, at least in comparison with the range found by Sverdrup, using Helland-Hansen's data, for a region of the North Atlantic (47° N, 12° W), notwithstanding the similarity of the *wave types* of the annual variation proposed in the present paper.

6. EVAPORATION FROM OTHER AREAS OF THE RED SEA

Computations similar to those summarized in the foregoing paragraphs have been carried out for the Gulf of 'Aqaba east of the Sinai Peninsula. The results indicate an annual evaporation of about 200 cm.

In view of the absence of monthly humidity data for the southern Red Sea, detailed calculations could not be undertaken. However, *estimates* are given below of the annual amount of evaporation for the sea area at about 20°N, and for a second area at about 15° N. Sea temperature, air temperature and pressure data are available in the charts.[18] Further, it was assumed that the mean annual cloud amount is 2/10 at 20° N and 3/10 at 15° N, in approximate agreement with a statement in the *Sailing Directions* published by the Hydrographic Office of the U.S. Navy.[19] With regard to the humidity of the air, the same source states: 'The driest air covers the Gulf of Suez, where the average relative humidity for the year is 71 per cent'; the relative humidity 'increases gradually to the southern Red Sea and Gulf of Aden where the average is 80 per cent' (p. 43).

[18] *Monthly meteorological charts of the Indian Ocean, op. cit.* (supra, n. 12).

[19] *Sailing directions for the Red Sea..., op. cit.* (supra, n. 17), p. 44.

Since the mean annual relative humidity is about 75 per cent in the Daedalus area (25° N), it was assumed that the average is 77 per cent for 20° N and 79 per cent for 15° N. With the help of both pertinent insolation data and the data listed in this section, the following results have been reached:

	20° N	15° N
Q_r, gcal/cm²/year	134,000	127,000
R	0.023	−0.070
L, gcal/g	581	582
$L(1+R)$, gcal/g	594	541
E, cm.	225	235

Although these results are subject to a possible error of a few per cents, they probably correctly indicate an increase southward of the annual amount of evaporation and if the numerical estimates above are correct, then the southward increase, from the Gulf of 'Aqaba to 15° N, would amount to about 35 cm. Energy equation computations for the North Atlantic[20] gave for 15° N an annual evaporation which is greater by about 20 cm. than the evaporation computed for 29° N, the approximate latitude of the Gulf of 'Aqaba.

7. CONTRIBUTION OF THE RED SEA TO THE WORLD-WIDE E-P (EVAPORATION MINUS PRECIPITATION) BALANCE

The results of the present note give for the whole of the Red Sea an average annual evaporation of about 215 cm. Since the average annual precipitation for that sea probably does not exceed 5 cm., the annual value of the variable E-P can be put at about 210 cm. With an area of 438,000 km² the yearly contribution of the Red Sea toward the world-wide balance of E-P is $0.92 \cdot 10^{12}$ m³. The relative magnitude of that contribution is large: it is more than twice the relative contribution of the Mediterranean Sea, itself an important contributor.

[20] Sverdrup, Johnson & Fleming, *op. cit.* (supra, n. 2), p. 121, fig. 27.

An Ammonite Seal

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An interesting group of ancient seals found in a tomb at Rabbath Ammon and published by Mr. Lankester Harding in the *Illustrated London News* of 3 Sept. 1949, p. 351, includes three inscribed seals. Of these the outstanding one bears the inscription לאדנר עבד עמנדב (to Adoninur the servant of 'Amminadab), the second reads לשנאל (to Shav-el), whereas the third, illustrated in fig. 9 of Mr. Harding's article, is described as 'a brown stone seal, showing the royal four-winged scarab and two lines of very worn inscription'. Apparently owing to its bad state of preservation, no reading of this inscription is given.

The object of this note is to discuss briefly this third seal, and to suggest a reading of the inscription engraved thereon.

Fig. 1

The oval of the seal is divided into three zones. The large central zone shows the Egyptian emblem of the winged scarab with the ball before it, flanked by two apparently misrepresented hieroglyphs. The engraving is of poor and crude workmanship, and is somewhat worn. The upper and lower registers contain the inscription in Phoenician characters, partly effaced and worn. A careful examination, however, of the excellent photograph published by Mr. Lankester Harding makes it possible to distinguish every one of the inscription's eleven letters, and thus renders its interpretation certain.

The accompanying drawing of the seal (a tracing of the published photograph) illustrates the suggested reading. The upper register contains the letters למנחם, only small parts of which are blurred.[1] Just above the line of the exergue, below the body of the scarab, the letter ב is clearly recognizable. The exergue beneath contains the letters בינחם. The first four letters are easily distinguishable, but only traces of the final *mem* are visible.

[1] Only an examination of the seal itself can establish whether the worn space at the end of the line contains one other letter, and whether an incised mark visible on the photograph in one of the upper corners of the central zone, under the first letter *lamed*, is a further letter or just scratches.

The inscription should therefore be read: למנחם בן ינחם = (belonging) to Menahem the son of Yenahem. *Mnḥm* (meaning 'consoler') is a common Hebrew proper name, and occurs on several Hebrew and Aramaic seals and impressions. *Ynḥm,* on the other hand, is very rare, and has hitherto been recorded on one seal only.[2] Its meaning is similar to that of the preceding name, but in the future tense: 'He (i. e. God) will console'. The imperfect *ynḥm* may, of course, have the passive meaning Yenuham, as paralleled by the Biblical proper names Yeruham and Yephunneh. In this case it would be the imperfect form of the proper name Nahum. From a more remote period *ynḥm* is recorded as a Semitic name on an Egyptian ostracon of the 18th dynasty, and as *ianḥamu* it appears in the El-Amarna letters.[3]

Palaeographically, the seal of Menahem may be compared with that of Adoninur servant of 'Amminadab found in the same tomb, and also with the seal of Adonipelet, another official of the same king, which was found some sixty years ago.[4] The most characteristic letter on our seal is the *het* with its single horizontal bar. This feature is common to the seal of עליה אמת חננאל— also found at 'Amman—[5] and to the above-mentioned seal bearing the legend אביחי בת ינחם. The names on our seal are pure Hebrew (as are those on the other seals referred to), but the style of lettering, especially of the *het* and the *nun,* belongs to the Aramaic branch of the Phoenician alphabet, which apparently prevailed in Ammon at this period under Mesopotamian influence.

The date of the seal is provided by its context with the Adoninur seal (the name may also be spelled Adoniner), for 'Amminadab his master is known to have been king of Ammon, and to have paid tribute to the Assyrian monarch Ashurbanipal (669-625 B.C.).[6]

[2] Cf. the seal אביחי בת ינחם: Diringer, D.: *Le Iscrizioni antico-ebraiche palestinesi,* 1934, p. 260, pl. XXII, 16; Reifenberg, A.: *Ancient Hebrew Seals,* 1950, No. 40 (photograph). The genuiness of this seal, which Clermont-Ganneau purchased in Cairo, has been questioned by Lidzbarski on trivial grounds, such as its low purchase-price, etc., despite his own statement that neither philologically nor palaeographically does the seal arouse any suspicion (*Ephemeris* III, 67 f.). When one considers the features common to this seal and the one discussed above—the same unusual name, the similar characters, the similar disposition of the inscription and the winged emblem—one cannot fail to relate both seals to the same period and sphere of culture.

[3] Cf. Knudtzon, J. A.: *Die El-Amarna Tafeln,* II, 1915 p. 1171. I owe this reference to Professor Maisler.

[4] C. C. Torrey, *Ann. Amer. Schools Orient. Res.,* 2/3, 1921-22, p. 103ff; Reifenberg, *op. cit.* (supra, n. 2), No. 35.

[5] Reifenberg, *op. cit.* (supra, n. 2), No. 27; N. Avigad, *Palest. Explor. Quart.,* 1946, p. 125.

[6] Torrey, *op. cit.* (supra, n. 4).

The Excavations at Beth Yerah (Khirbet el-Kerak) 1944-1946*

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1. INTRODUCTION

KHIRBET EL-KERAK ('the Ruins of the Castle') is the Arabic name of an extensive ruined site, ca. 200 dunams (20 ha) in area, situated at the issue of the Jordan from the Sea of Galilee. It is usually identified with the Talmudic Beth Yerah ('The house of the Moon [god]') and—with less certainty—with the Philoteria of Polybius (v, 70) and Syncellus (Bonn I, 559).[1] Surface explorations have shown that the site was settled in the Early Bronze Age (third millenium B.C.) and in the Hellenistic and Roman Periods. A distinctive type of Early Bronze pottery of Khirbet el-Kerak was noticed by Albright long before the excavations and is known in Palestinian archaeology as 'Khirbet-Kerak Ware'.[2] Pottery of this type has since been found at Beth-Shan, Megiddo, Affulah, Tell el-Hamme, Jericho, Tell el-Judeidah in Northern Syria and other sites in Syria and Palestine. It has been assigned to Early Bronze Age III, i.e. to the 26th to 24th centuries B.C.[3]

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* This preliminary report is a condensed and amended translation of two articles which appeared in Hebrew in *Bull. Jew. Palest. Explor. Soc.*, 11, 1943-45, pp. 77-84; *ibid.*, 13, 1946-47, pp. 53-64.

[1] The identification was based on Polybius, who merely states that Philoteria was on Lake Gennesareth, from which flows the River Jordan, etc.; this passage has been misunderstood to mean that the actual site was at the outflow of the river. The Talmudic sources identifying Beth Yerah are much more explicit. Bab. Talm. *Bikkurim* 55a: 'The Jordan is accounted only from Beth Yerah and below'; Jer. Talm. *ibid.*, I,81a: 'There were two autonomous cities: Beth Yerah and Sinnnbri.' Cf. *Bereshit Rabba* 98, 18: see also E.L. Sukenik, *Journ. Palest. Orient. Soc.*, 2, 1922, pp. 101 ff.; Dalman, G.: *Orte und Wege Jesu*, 3rd. ed., Gütersloh, 1924, pp. 194 ff.; Avi-Yonah, M.: *Map of Roman Palestine*, Oxford, 1940, p. 37, and *Geografia historit* (in Hebrew), 2nd ed., 1951, p. 139; A. Alt, *Paläst. Jahrb.*, 1933, pp. 78 ff, 86 ff.; Klein, S. ed.: *Sefer ha-Yishuv*, I, Jerusalem, 1939, pp. 18 and 163-4.

[2] W. F. Albright, *Ann. Amer. Schools Orient. Res.*, 6, 1925, pp. 27 foll.; id., *Journ. Pal. Orient. Soc.*, 15, 1935, p. 200.

[3] On Kh. Kerak Ware see in particular: Y. Sukenik (Yadin), *Bull. Amer. Schools Orient. Res.*, 106, 1947, pp. 9-17; R.B.K. Amiran, *Israel Explor. Journ.*, 2, 1952, pp. 90 ff.; Schaeffer, C.F.A.: *Stratigraphie comparée et chronologie de l'Asie occidentale*, London, 1948, p. 41 f.; N. Glueck, *Annual Amer. Schools Orient. Res.*, 25-28, 1951, pp. 138, 238-9; G.M.A. Hanfmann, *Amer. Journ. Archaeol.*, 55, 1952, pp. 360, 363 f.

In 1941 an Early Bronze Age tomb-cave was found at Kibbus Kinneret west of Khirbet el-Kerak. Excavated by B. Maisler, it contained burnt bones and many additional objects, such as jewellery, about fifty pots and many potsherds, all of which could be dated to Early Bronze Age II, i.e. the 29th to 27th centuries B.C.[4]

The excavations at Khirbet el-Kerak were undertaken by the Jewish Palestine Exploration Society with funds supplied in part by the Jordan Valley settlements, and in part by the General Federation of Jewish Labour (in memory of the late Labour leader B. Kaznelson). The first campaign of excavations was started in the southern part of the site in 1944/45 by B. Maisler and M. Stekelis, with the assistance of P. Bar-Adon, I. Dunayevsky, architect, Mrs. R. Hestrin and Mrs. T. Dothan, student-assistants. The second season (1945/46) was directed by M. Stekelis and M. Avi-Yonah, with Y. Yadin (Sukenik) as honorary assistant, and Mrs. R. Hestrin and Mrs. T. Dothan as assistants; I. Dunayevsky and M. Kon were the expedition's architects.

2. THE SOUTHERN AREA, BY B. MAISLER AND M. STEKELIS

The excavations were carried on for the whole length of a trench, 100 m. long by 7 m. broad, and were extended to 1600 sq. m. As the excavation progressed, the remains of two distinct periods were distinguished, viz. the Hellenistic and Roman Periods, and the Early Bronze Age.

A. The Hellenistic and Roman Levels (Pl. 10)

A series of buildings was discovered, which formed part of a quarter of the Hellenistic town (see fig., p. 168-9). A street, running from south-east to north-west, was flanked on both sides by blocks of buildings built of basalt rubble. A big house, which in its south-eastern part had a rectangular shape (22 by 12 m.), included a central court paved with rubble. On three sides of the court were built eleven rooms of varying size and purpose (ovens, store-houses, kitchen etc.). From the evidence of pottery (Rhodian jars) and coins it appears that this block of buildings was constructed in the Ptolemaic period.

A second block of buildings of the same period was found to the north-east of the principal road; it included a big building, ca. 15.50 by 10 m., with one frontage on the main street and the other on a small side road. This building had eight rooms.

[4] B. Maisler, *Bull. Jew. Palest. Explor. Soc.*, 10, 1942-43, pp. 1 ff; Ruth B.K. Amiran, *ibid.*, pp. 63 ff.

At a later period and on a slightly higher level, a construction of considerable size was erected over the Hellenistic remains. Its walls run in a direction different from that of the earlier constructions. Of this building are preserved only part of the outer walls, 32 m. long on the eastern side and 18 m. on the southern.

B. The Early Bronze Levels

The foundations of the Hellenistic buildings were seen to rest almost immediately on the remains of the E B houses; the two are separated only by a thin stratum of earth. This shows that the site remained uninhabited from the E B Age to the Hellenistic, *i. e.* for a period of 2000 years and above.[5]

The excavation continued to 4.20 m. below surface, and a deep cutting was made near the stone city wall (see below p. 172) down to virgin soil at 7.30. Four periods of Bronze Age settlements were identified, called Beth Yerah I, II, III and IV.

Beth Yerah I. — This earliest settlement was founded on virgin soil. The inhabitants at that time did not build houses. They lived in huts which were sunk for about half of their height in pits dug in the ground. Such pits were excavated in squares 3-23, 11-12, 33, 14. Their depth reached from 0.50 to 3.50 m., and their diametre was from 3 to 4 m. approximately. Thin layers of dust and ashes, mixed with potsherds and broken and burnt animal bones, occasionally filled these pits. In one of the pits an oven of round shape was found, its diametre was 0.80 m. It was built on a pavement of basalt stones and had the form of a dome of mud and reeds. On the pavement were found soot and ashes mixed with carbonized bones. Near the oven was a heap of shells, remnants of the repasts of the pit-dwellers. The grey-burnished ware of the so-called 'Esdraelon culture' found in these pits may be assigned by their technique and decorations to the Late Chalcolithic Period, and the transitional period to E B I, corresponding to Beth-Shan XVII-XVI, the earlier phase of Megiddo XIX and the 'Eneolithique supérieur of Tell el-Far'ah near Shechem.[6]

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[5] As regards the south-eastern part of the tell, which overlooks the present-day outflow of the Jordan from the Sea of Galilee, excavations conducted at the time of writing by Mr. P. Bar-Adon on behalf of the Israel Department of Antiquities have revealed the presence of MBI - MB II strata, whereas in the earlier excavation here described such periods were hardly indicated. The same applies also to the Persian Period, remains of which were found by Mr. Bar-Adon in his recent excavation, but were quite absent in our cut.

[6] G.M. Fitzgerald, *Museum Journ.*, 24, 1935, pp. 8-10; Loud, G.: *Megiddo II*, Chicago, 1948, Pl. 97; R. de Vaux, *Rev. bibl.*, 1947, pp. 400-403, 408-409.

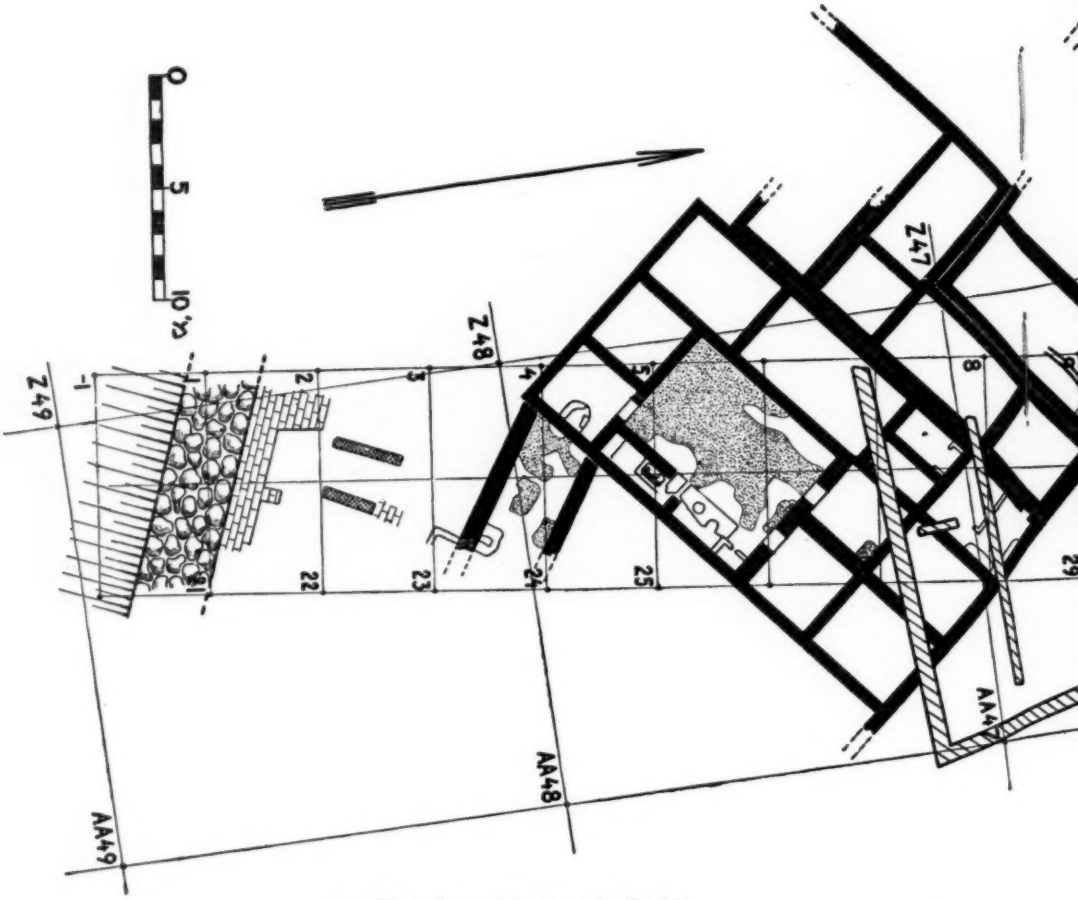
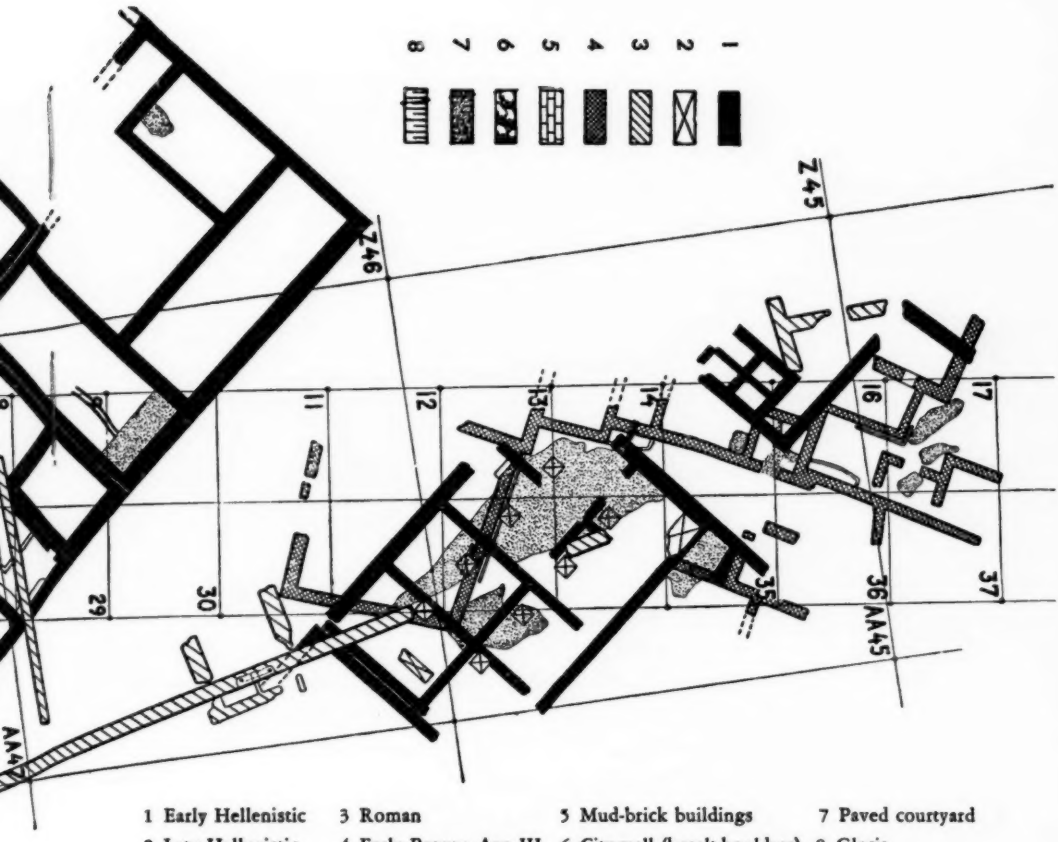


Fig 1. Plan of the excavations, April, 1945.

Beth Yerah II. — On the B Y II level we find for the first time houses built of mud-brick; they are very primitive, but still manage to keep a square shape. Their foundations were laid after a very rough levelling directly on those of the previous stratum or on virgin soil. The mud-bricks measure 10x25x30 cm.; every brick has indentations and projections for jointure with the others.

In squares 14, 15, 34 and 35 several layers of walls were preserved, adding-up to 0.70 m. Occasionally layers were found stuck together by mud mortar. In squares 31-11, 30-10 was a courtyard and an outer corner of a house. In the corner of the house a basalt bowl was found and near it scattered potsherds.



1 Early Hellenistic 3 Roman 5 Mud-brick buildings 7 Paved courtyard
2 Late Hellenistic 4 Early Bronze Age III 6 City wall (basalt boulders) 8 Glacis

Not far away there may be seen other basalt stones (the paving of a courtyard?). The corner of this pavement was still visible in the form of two basalt stones. On the pavement was a thin layer of ashes, containing soot, carbonized bones and a great quantity of potsherds. At the same level, in squares 3-33, were found walls preserved to a height of 0.50 cm. and above. Beth Yerah II existed for a long time, its accumulations reaching 1.50 m.

Pottery of earlier E B A type was discovered in this level. Typical are red-burnished vessels, and especially the band-slip (grain-wash)[7] pottery, in various colours; also an early type of holemouth jar, characteristic ledge handles, flat bases, short and broad, all made of brittle and gritty clay with a tournette.

[7] N. Glueck, *Ann. Amer. Schools Orient. Res.*, 25-28, 1951, pp. 253-4.

Special attention should be accorded to a tournette for making pottery which was found—one of the rarest objects so far discovered in Palestine. Combing stops here in a very early phase of E B I.

It is noteworthy that in the deep cutting near the stone city wall an interval of about 1.5 m. separates the floors of the E B I buildings from the stratum below (B Y I); in this no remains of buildings were discovered, but only a great quantity of E B I potsherds as well as the animal figurines (see below p. 171).

Beth Yerah III.—This third settlement did not apparently continue for long, but even so it shows evidence of efforts to improve the current methods of building. The foundations of the walls now consist of one layer of basalt stones, covered by beaten earth to a depth of 20 cm. This layer is followed by another, also of basalt stones. In one place the foundation of a wall was built of two layers of basalt stones, without the intervening layer of beaten earth.

This E B A II stratum did not show any evidence of Khirbet Kerak Ware, but had pottery resembling that of the tomb found at Kinneret (see also Pl. 11 B). To this stratum we may perhaps assign the earliest town wall (see below, p. 172). Inside the city was found a building constructed of layers of sun-dried bricks, of which the outer (southern) extremity reaches the stone wall (squares 2, 22). This building preceded the Khirbet Kerak stratum. Inside the building two rooms could be distinguished: in one of them (the eastern one) was found a big jar and inside it a jug, which stood on a platform of four stones; in the second room there was a store of various pots, such as five big two-handled jars, an oil-jug of the type found in the Kinneret tomb, etc., all pottery types of E B A II, i.e. apparently of the 29th to 27th centuries B.C. In this level was found a seal-stamp resembling those of Megiddo Stage V.[8] Two phases of B Y III could be distinguished in the deep cut near the stone wall, separated by floors and large vessels *in situ*.

In squares 35, 36 another building was found, a kind of room or courtyard, the walls of which consisted of basalt stones and were 0.30 m. thick. An oven stood in its north-western corner on a platform of great flat stones and on them was a layer of half-burnt mud-bricks with reed-impressions. Inside the oven were ashes, burnt bones and carbonized sherds. At some distance from the oven were some flat stones covered with traces of soot and ashes. In the deep cut two clear phases of the period were distinguished, separated by floors.

[8] Engberg, R.M. & Shipton, G.M.: *Notes on the Chalcolithic and Early Bronze Age Pottery of Megiddo*, Chicago, 1934, pp. 31 ff., fig. 11.

Beth-Yerah IV.—This latter settlement lasted longer than any of its predecessors, its accumulation reaching 2 m. in depth. Four stages of building may be discerned on this level. Most of the houses were built of basalt stones, without any mud bricks, but occasionally brick-walls on stone foundations are still found in this stratum. In squares 13-33, 11-31 was a building measuring 7 m. by 8 m. It is orientated north-south, with a door in the north wall. Along this wall was found a buttressing wall of layers, one stone thick. In square 31 was uncovered a semicircular wall, and near it a bench built entirely of mud brick.

It appears that the Khirbet Kerak period lasted a very long time on this spot. To it we should assign a series of buildings in the northern part of the trench; some foundations and remains of walls built of basalt rubble belong to these. In the N end of the trench, from the squares 17-37 onwards, there were no remains of later buildings. The rooms found in the squares 14-17 and 36-37 of the trench include: a room, 2 m. square, which one entered through a narrow door (the treshold and the door opening had been preserved in squares 15-16). The room was paved with basalt stones, and in one of the corners opposite the door was found a semicircular stone construction. In its centre was a basalt bowl sunk in the centre of a pavement of small stones. In the bowl there were broken bones and a layer of ashes. It should be noted that similar bowls were found at various other points. Near this square room, on the N side, was a rectangular room; it had a bench built of basalt stones near one of its walls (length 2.35, width 0.60 m.); it might have served as a bed. In the stratum described were found, besides the numerous potsherds, five small figurines of animals and two model mills made of clay, as well as a pottery piece representing a roaring lion. Among the flints, mention should be made above all of the sickle- and knife-blades.

The pottery of Beth Yerah IV belongs to the E B A III, according to the classification of Wright, viz. it is characterised by the Khirbat Kerak Ware, and belongs approximately to the 26th-24th century B.C. (the III-V dynasty of Egypt).

The sherds and vessels of Kh. Kerak Ware (Pl. 11) are very numerous and varied in their forms; they were found in great quantities. Some of these are distinguished by the burnish on one side only, and by their colour: brick-red, brown, yellowish, etc.; others are in various combinations of red, brown and black. Many sherds are decorated with incisions or ribbing (mostly

in diagonal pattern), and there are a few which show a potter's mark, an ornament or even a schematic incision representing a human figure. Of the hundreds of sherds and fragments of vessels found in the area excavated only a few probably belonged to E B A IV (last third of the third millenium B.C.), and still fewer to the M B A I (beginning of the second millenium B.C.).

The fortifications of Beth Yerah.—In the course of the excavations remains of fortifications of various periods were uncovered. Soundings were made at two separate points: (a) the southern trench where a fragment of the stone wall was found; (b) ca. 40 m. to the east of the trial trench, where a section of the mud-brick wall was uncovered (Pl. 9). It was established that the brick-wall was the older of the two and was built on virgin soil; it belongs to B Y II, i.e. to E B A I. The stone wall is built of basalt boulders, and may be assigned at the earliest to B Y IV, i.e. to E B A III. The two walls are not parallel.

The brick wall. In the sounding made to the east of the trial trench this wall ran from east to west. It was built of flat mud bricks (10 by 30 by 40 cm.). The builders first dug a trench 2 m. deep in virgin soil (the width of this excavation could not be established, but in any case it exceeded 4 m., the width of the sounding at this spot). The earth dug out from the trench (with the addition of water and a quantity of sand and crushed stones) was used for making the bricks, from which the wall was erected at the outer (southern) end of the trench. The wall was built in three separate sections: a vertical wall in the middle, and attached to it, two walls with a straight face on the outside and an inclined one on the inside. All three parts were joined together by mud mortar. All three parts were constructed of joined layers, which were bound together with mud mortar. The three parts formed together a solid block of walling, the width of which reached 8 m. The northern (inside) inclination is covered with pebbles; these form a kind of glacis, which descended and protected the earth-face. This wall has been preserved to a height of ca. 2 m.

The stone wall. A thick layer of occupation debris separated the brick wall from the stone wall above it, thus indicating the time which elapsed between the construction of the two. This stone wall consists of basalt boulders. Its width is 4 m. and its preserved height 2 m. The foundation trench was dug in the accumulations of B Y III to a depth of 40 cm. The wall is well preserved. A good deal of its length is still underground and forms a kind of elevation along the slope of the mound. The construction of the stone wall was rather primitive; the layers of stone are not straight and the stones are not joined

together. Near it were the remains of a building orientated towards the north and 4.20 m. in width, which might have been a tower. The outer (southern) side of the stone wall was protected by a glacis (?) of beaten earth.[9]

COMPARATIVE TABLE

	Beth Yerah	Beth Shan	Megiddo	'Amûq	Egypt	
L Chalc.	I	XVII-XVI	XX (late)	E-F	Gerzean	till app. 3200
E B I	II	XV-XIV	XIX (early)	F-G	Late Gerzean-Beg. of Dynasty I	32th-30th cent.
E B II	III	XIII	XVIII	G-H	Dynasties I-II	29th-27th cent.
E B III	IV	XII-XI	XVII-XVI	H-I	Dynasties III-V	26th-24th cent.

(To be concluded)

[9] In his recent excavations Mr. Bar-Adon has found the remains of a similar stone wall, which he attributes to the Middle Bronze Age. The question of the dating of the stone wall of Beth Yerah must therefore be as yet considered an open one.

Damascus in Assyrian Sources

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In Gen. xv, 2, the role of Eliezer in Abraham's household is that of בן־משק, whose Aramaic *(sic!)* equivalent is given as דמשק in the same verse. As I have shown in *Journal of Biblical Literature*, 70, 1951, p. 161, this דמשק is a common noun designating a 'servant'. This solution of a hitherto unsolved *crux interpretum* was based on the Akkadian rendition of the city-name Damascus as *sha imêri-shu** 'donkey boy=servant' (occurring interchangeably with the simple transliteration *Dimashq*—in the Assyrian annals). The *sha* shows that the ד of דמשק was understood as the proclitic relative pronoun. The *-shu* of *sha imêri-shu*[1] is an inner Akkadian development and no equivalent for it is to be sought in the Aramaic דמשק. However, up to the present it has not been explained how משק found its way into the Assyrian annals as *imêru* 'donkey'. For while *sha imêri* and דמשק mean 'servant' in a general way, משק resembles no known word for 'donkey'.

The comparison of this משק with Hebrew מַשְׁקֶה is welcome, but its association with water has not led to felicitous results; and, moreover, the explanation of *imêru* (in *sha imêri-shu*) as 'windlass, pulley'[2] leaves much to be desired and in no way explains דמשק in Gen. xv, 2. Indeed, even for the city-name it is quite unsuitable because Damascus has so much water that mechanical devices for raising water are generally superfluous and in any case would hardly be appropriate in describing what Easterners have with some justification long regarded as the closest approximation to Paradise on earth. The appropriate usage of משקה, in this instance, has to do with the cup-bearer who serves not water but wine. Thus the משקה in Gen. xl, 5 is not the royal water-boy but the butler who serves Pharaoh with the juice of grapes (Gen. xl, 11). Similarly, Nehemiah, who is the court משקה (Neh. i, 11) in Susa, serves Artaxerxes wine (Neh.

* The editors regret that for typographical reasons the letter *š* had to be transcribed *sh*.

[1] A. L. Oppenheim in *Ancient Near Eastern Texts*, Princeton, 1950, p. 278, n. 8, points out (1) the idiom *awîlsha X-shu*, where X can be an animal, and (2) the town name *sha birê-shu*.

[2] E. A. Speiser, *Journ. Amer. Orient. Soc.*, 71, 1951, pp. 257-258.

ii, 1).[3] The name 'Damascus' having, as it did, also the function of a common noun, invited translation as well as transliteration in the Assyrian annals. There was no problem in rendering ד as *sha*. But a slight slip was made in translating חֶמֶר 'wine' as though it were חֲמֹר 'donkey'.[4] To be sure, the general sense of 'servant' was nevertheless preserved.

That Eliezer is described as Abraham's wine-serving butler is easy enough to accept. But is it likely that the city of Damascus would be conceived of as abounding in wine rather than water? There is good reason for an affirmative answer: the fertility of Damascus has been proverbial throughout history. If any place in the Near East deserves the hyperbolic description that Sinuhe gives of a land in Syria, it is Damascus:[5] *wr n.f irp r mw* 'it has more wine than water'.

In any event, דמשק[6] in Gen. xv, 2 is an Aramaic common noun and should be added to the repertoire of Biblical Aramaic. That a bit of Aramaic should appear in the Patriarchal Narratives is not surprising in the light of יגר שהדותא, which is supplied with a Hebrew equivalent גַּלְעֵד in Gen. xxxi, 47, much like Aramaic דמשק = Hebrew בן־משק in Gen. xv, 2.[7]

[3] Cf. Arabic ساقی 'cup-bearer', especially familiar from Persian poems beginning with the Arabic cliché یا ایها ساقی.

[4] The Semitic roots *khmr* ('wine') and *ḥmr* ('donkey') fall together in Aramaic and Hebrew. — What I visualize is the Assyrian annalists asking the Damascenes to explain the city name and receiving the answer that it meant 'that of חֲמֹר'. The situation will appear natural enough to anyone who has done field work involving Near East topography.

[5] It is not my intention to identify Yaa with Damascus but only to show that it is in keeping with ancient Near East literature to describe a fruitful area as having 'more wine than water'.

[6] Regardless of whether it is rendered 'cup-bearer', 'major-domo' or more vaguely 'servant'.

[7] Interpreting גַּלְעֵד as גַּל עֵד is certainly popular etymology; and I do not mean to exclude the possibility that 'Damascus' is a pre-Aramaic place-name that underwent Aramaic popular etymology. In fact non-Semitic derivation is suggested by the biblical variants: דמשק, דמשק, ורמשק, etc.

Pottery Types from the Jewish Ossuary-Tombs around Jerusalem*

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THE *piriform bottle* (or piriform unguentarium). The elongated neck, which is a common feature of both the piriform and the spindle-bottle (see above, p. 131 ff.), proves that the piriform bottle too contained unguents. Instead of the high foot of the spindle-bottle, which lacked a proper standing balance, we find here a squatter, broad-bottomed type, easily fitting into the palm of the hand. Four variants of the piriform bottle can be distinguished, but only two of these types occur in the ossuary-tombs.

Variant *a* has an oval body and a comparatively long neck, usually combined with a protruding, offset rim. The vessels are in general not particularly well made. The mouth was often dipped in red paint. The average height is 10-20 cm. (our Pl. 12*a*).[41]

Variant *b* is distinguishable by the more sacciform body, i.e. the highest point of the bulge is placed lower; it has a shorter neck which as a rule tapers into the body; the rim is mostly not offset but flaring. The average height is 8-12 cm. (our Pl. 12*b*).[42] Many intermediate variants make an exact delimitation of *a* and *b* difficult (see also infra, p. 179).

Of the two other variants which do not occur in the ossuary-tombs, *c* can be proved to be a type mainly of the first half of the first century A.D., which occurs in the Hellenized cities of Palestine (including Petra and 'Amman); it was in use also in other sites in the Imperium Romanum (Pl. 12*c*, from Petra).

Variant *c* shows a comparatively small piriform to conical body, a swelling tubular neck markedly set off against the body, and a projecting rim. The height

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* Continued from *Israel Exploration Journal*, Vol. 2, No. 2, 1952, pp. 125-139. Abbreviations cf. *ibid.*, p. 125 f.

[41] E. g. Sukenik, p. 70, fig. 8, upper row, third vase from the left; Maisler-Stekelis, Pl. II:6 (centre), and Pl. IV:1. Our Pl. 12*a* reproduces a bottle from a tomb at Acre-Ptolemais (now P. A. M., Inv. No. 44. 138).

[42] E. g. Sukenik, p. 70, fig. 8, upper row, third vase from the right; Maisler-Stekelis, Pl. II:5 (left), and Pl. IV:2 and 3 (2, now P. A. M., Inv. No. 31. 340 = our Pl. 12*b*).

varies between 8 and 18 cm. Most of the vessels are carefully made, the clay is well levigated, the surface well smoothed. The rim with the adjoining part of the neck has usually been dipped in red-brown paint (see also variant *a*). Notwithstanding the high quality of the specimens of *c*, which far surpasses the other three variants, they should be considered of local rather than of foreign make because of their frequent occurrence in Palestine.

Examples: Harding, Pl. XX:6 a and b, and p.60, fig. 2:6a (from 'Nabataean Tomb' at 'Amman). Some remarks on this tomb-group: 1. Variant *c* occurs also in glass (*l. c.*, No. 15).—2. The occurrence of our bottle-variant *d* (*l. c.*, Nos. 4 and 5).—3. The occurrence of two lamp types which are also represented in Jewish ossuary tombs: *l. c.*, Nos. 1 and 3 (debased Hellenistic type), No. 2 (Herodian type, 18 specimens).—4. The occurrence of Nabataean pottery (*l. c.*, Nos. 20, 21).—5. The occurrence of Eastern terra sigillata bowls (*l. c.*, Nos. 7, 8: 'Ritterling type 9 and 5 respectively', both of the Augustan period).—We should therefore date the whole tomb-group not before the Augustan period, and in all probability to the beginning of the I century A. D.—Further examples have been found at Petra (*Quart. Dept. Antiq. Palest.*, 9, Pl. XLIII, 380: 'Nabataean, Fine Plain', 384: 'Nabataean, Coarse Plain'), at Ascalon, at Beth Shan-Scythopolis (in the probably non-Jewish northern necropolis of the first half of the first century A. D.), in the cemetery of Acre-Ptolemais (first century A. D.). In the Palestine Archaeological Museum there are many as yet unpublished examples from these and other sites. Outside Palestine representatives of this type were found in Cyprus (Amathus, Tomb 21: *SCE*, Vol. II, Pl. XXVI:1, the two vessels to the right below=Pl. CXVIII:5 and 8), at Tarsus in Asia Minor (Frances Follin Jones, in *Excavations at Gözlü Kule, Tarsus*, I [henceforth TARSUS], Plates, fig. 159: Nos. 734, 736, possibly also 730; Text, pp. 172, 200, 270: 'Early Imperial Period'), and at Cologne (*Die Denkmäler des römischen Köln*, I, 1928, Pl. 78, right: 'First half of first century A. D.').

Variant *d* seems to be of Nabataean origin and apparently belongs with *c*, with which it was found, to the first half of the first century A. D. (our Pl. 12*d*). It has a bee-hive-shaped body with a base in form of a very shallow conus; the vessel was therefore not meant to stand. The rim is small and offset; the neck is slightly bulgy as is the neck of variant *c*. The ware, of the pinkish red clay characteristic of Nabataean pottery, is definitely coarse, particularly in the texture of the surface; the lower half of the vessel is deeply grooved. The variant appears in a large and a small size: average height about 20 and 8-12 cm. respectively. Despite its lack of elegance this variant, because of its originality, has a certain aesthetic attractiveness. Variant *d* is by no means rare; many more as yet unpublished specimens are in the Palestine Archaeological Museum. The survival of this type into the III-IV centuries A. D. is shown by a

tomb-group found in el-Makr (NE of Acre); there coins of the III and IV centuries and glass vessels were associated with a whole series of locally made bottles of this type.[43]

For examples see: Harding, Pl. XX: 4,5 a and b: for this tomb-group see the remarks above; Horsfield, Pl. XXI: 155 (with stratum II. 1, from filling of shaft of Tomb B 1; the context of this tomb—cf. Horsfield, p. 106—allows us to date it to the first half of the first century A. D.); Pl. XXIV: 173 (with stratum II. 1); Pl. XXV: 185 (with stratum II.1, from filling of the shaft of Tomb E 1): the lamp found in this tomb, *l. c.*, Pl. XXV: 186 (Broneer, type XXII), does not contradict a dating of this bottle too to the first half of the first century A. D.; for further context from this tomb, see *l. c.*, p. 106.

Variants *c* and *d* are roughly contemporary and are related in type with *a* and *b*. However, we do not know of any finds of *c* and *d* in Jewish ossuary-tombs, while *a* and *b* are quite common in both Jewish and Gentile cultural spheres. This relation may be explained by assuming that the variants *a* and *b* are typologically somewhat older than *c* and *d*, and that the Nabataean type *d* quite possibly remained unknown to the Jerusalem Jews, who continued to cling to the types they had formerly adopted.

Variant *a* represents a principal item in the funerary equipment of the ossuary-tombs around Jerusalem, but it also occurs very frequently in other tombs or cities of Palestine, such as the Hellenized towns of Ascalon, Samaria-Sebaste,[44] in the North Cemetery of Beth Shan-Scythopolis mentioned above, and in the necropolis of Acre-Ptolemais. As variant *a* is found together with variant *c* (e.g. at Beth Shan) and with Roman lamps of the Augustan period (also at Beth Shan), it appears to have flourished during the age of Augustus. It does not seem to have survived long afterwards, but it may easily have started somewhat earlier, probably not before 50 B.C.

This dating seems to be corroborated (i) by the evidence from Tarsus, however incomplete regarding the initial appearance of the type, see F. F. Jones, TARSUS, I, pp. 172 and 200 with note 154 (generally on the piriform bottle): 'This type must have begun late in the first century B. C. for it is not associated with the Hellenistic-Roman Unit' (= roughly mid-II—mid-I century B. C.), 'but appears in the Roman fill and its contemporary deposits of the first part of the first century A. D.'; (ii) by the negative evidence from the Athenian Agora: 'It is not found in Thompson's five groups in the Athenian Agora, which go down to the first century B. C., but is present in the first century A. D.' (quoted from F. F. Jones, TARSUS, I, p. 200, note 154).

[43] Now in the Museum of the Israel Department of Antiquities, Jerusalem; the excavation is referred to in *Amer. Journ. Archaeol.*, 55, 1951, p. 86.

[44] Reisner, I, p. 302, fig. 179a, and II, Pl. 67 l.: type 15a.

Possibly the later variant *a* developed under the influence of the spindle-bottle, with which it has in common the long, pipe-like neck with projecting offset rim and the greater bulginess of the body of the vessel (as compared with variant *b*). This supposition, as well as the derivation of *a* suggested here, should, however, be regarded as quite hypothetical.

Outside Palestine variant *a* occurs frequently in the Greek as well as in the Roman sphere during the earliest Imperial period.[45]

The connecting link with Early Hellenism is furnished by variant *b*, even if for the time being this connection is rather thin and fragmentary. Two unmistakable and fine specimens of *b* were found in the necropolis of Chatby at Alexandria, which is dated to the late fourth and early third century B. C.,[46] i.e. they belong, together with the spindle-bottle, to the Early Hellenistic Period. A piriform bottle with squatter body and shorter neck, from a tomb at 'Atlit, seems to belong roughly to the same time.

Johns, p. 78, fig. 47, from Tomb L/21 B (burial b-XI). As the vessel in question is the only equipment found with b-XI, we do not have any external evidence as to its date—probably late IV-III century B. C.—A bottle of similar shape but of different fabric was found, together with a bottle of variant *d*, in Tomb E 1 at Petra, attributable to the first half of the first century A. D., see supra, p. 178.

In spite of the difference in proportion we can hardly separate the two Early Hellenistic bottles from variant *b*. The remarkable scarcity of the Hellenistic type in Early and Middle Hellenism must mean that the type, although known, became fashionable only at a much later time.

As we have said above, there is no sharp distinction between variants *a* and *b*.[47] As *b* can be traced much further back than *a*, and is the typologically much older variant, it seems to have split gradually into the two variants *b* and *a* (with many intermediate forms) during the second half of the first century B. C.

Outside Palestine a mixed form of variants *a-c* occurs in two datable groups of finds: (a) In a tomb at Priene, which Th. Wiegand has assigned to the

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[45] See Dragendorff, p. 283 f. with fig. 480 d (resembling our variant *a*, but with a wider neck, tapering upwards). Dragendorff remarks as regards the wide distribution of this type: 'der Typus kommt mindestens seit augusteischer Zeit vor... Häufig in Pompeji und Tarent (ebenfalls I. Jahrhundert n. Chr.). An beiden Orten finden sich auch schon Flaschen der gleichen Form aus Glas, die dann in der Folgezeit auch in den nördlichen Provinzen zum allergewöhnlichsten Grabinventar gehören und sich bis in späteste Zeit halten.'—A transitional form between *a* and *b* appears among the finds in Tomb 21 at Amathus in Cyprus (long neck, but sacciform body), see *SCE*, II, Pl. XXVI, 1, below, third vessel from the right. [46] Breccia, p. 87, fig. 46 (two specimens of the same type). As regards the date, see supra, p. 134 with note 32.

[47] Compare e. g. the specimens quoted supra in notes 41 (variant *a*) and 42 (variant *b*).

beginning of the Christian era on the basis of a coin of Augustus found therein; however this group should, it seems, be dated somewhat later.

Wiegand-Zahn, p. 279, fig. 290 (esp. c) and p. 427, fig. 545 (esp. 109). As we have since learned, coins provide a terminus ad hoc only under certain circumstances. The correspondence with the Beth Shan tomb-groups, dated by lamps, makes us consider a somewhat later date, the first half of the first century A. D. Loeschcke, p. 202, note 1, dates the tomb 'frühestens ins 2. Viertel des I. Jahrhunderts n. Chr'. We should here point out, that the glass and pottery vessels in this tomb correspond in their shapes, as they do in the Beth Shan-Scythopolis-tombs and in the 'Nabataean Tomb' at 'Amman (see supra, p. 177; cf. also supra, n. 45).—F. F. Jones, TARSUS, I, p. 200, note 154, mentions some more sites where specimens of the piriform bottle have been found: Corinth (in a well-group dated in the Augustan period, see Th. L. Shear, *Amer. Journ. Archaeol.*, 32, 1928, p. 485), Thera (Dragendorff, p. 284), Dura-Europos (N. P. Toll, *Excavations at Dura-Europos*, Ninth Season, Pt. 2, The Necropolis, pp. 106-107).

(b) In the Roman fort of Haltern (Westfalia), attributed by conclusive external evidence to the years 11 B. C.—16 A. D.

Loeschcke, p. 201 f., Pls. XXI: 10; XI: type 31: 'Die Langform', i.e. our spindle-bottle, findet sich nur noch in der frühesten Kaiserzeit, während die Kurzform', i.e. our piriform bottle, 'sich noch länger hält. Seit dem 2. Drittel des I. Jahrhunderts n. Chr. verschwinden aber die tönernen Ölflaschen rasch zugunsten der gläsernen'. In its essentials the situation corresponds to that in Palestine. Cf. also supra, p. 136 f. Loeschcke, p. 70, mentions some more bottles found in Germany.

A very important further clue to the dating of a series of ossuary-tombs is furnished by the fact that the mass production of glass vessels, which resulted in an at least partial displacement of pottery (including our types of unguentaria), began only with the introduction of glass-blowing during the early Augustan period. As the glass vessels in the ossuary-tombs are certainly not of the earliest blown glass, we can exclude with confidence any pre-Augustan dating for blown glass vessels. Obviously, then, no Jewish ossuary-tombs which include blown glass can be pre-Augustan.

The invention of glass-blowing is now generally assigned to the early Augustan period, cf. A. Kisa, *Das Glas im Altertume*, I, 1908, p. 295 ff.; G. A. Eisen, *Glass*, I, 1927, p. 115 f.; D. B. Harden, *Roman Glass from Karanis* (Univ. of Michigan Studies, Hum. Series, Vol. XLI, 1936), p. 39 f.; P. Fossing, *Glass Vessels before Glass-Blowing*, 1940, p. 2. The new technique originated in all probability in Syria (Sidon); the complementary transition from coloured to plain glass is possibly due to Egypt (so Kisa, *l. c.*, p. 300, and apparently also Eisen, *l. c.*).

According to the literary sources and the evidence of the excavations the centres of the manufacture of blown glass were in Syria, in Palestine, and in Egypt.

Although we may not doubt the correctness of the literary tradition which assigns to Egypt (Alexandria) a prominent role in the production of blown glass during the early Imperial period (see the preceding remark), this literary tradition has so far remained unsupported by finds; the important finds of glass at Karanis (in the region of the Nile Delta) begin only ca. 100 A. D. (see Harden, *l. c.*, p. 39 f.). In this find-group, as in many others in Syria and in Palestine on both sides of the Jordan (e.g. at Jerash, see P. V. C. Baur, in *Gerasa*, ed. C. H. Kraeling, 1938, pp. 513 ff.) have appeared glass *unguentaria* of the most varying types and periods, down to the Early Arab; amongst them are shapes which are obviously a derivation from the pottery vessels of the ossuary-tombs.

From the centres mentioned the glass vessels — which soon became very popular — were exported to the various provinces of Rome. Together with the find-groups in Priene, Tarsus, and Haltern, this shows clearly that the same types of vessels, pottery as well as glass, were in general use all over the Roman Empire in Augustan and post-Augustan times. No one has seriously cast doubts on the Mid-Eastern provenance of these glass vessels; and the same must also be true of the closely related pottery.

Of course, the pottery shapes, unlike the glass vessels, were soon copied everywhere in the Roman Empire in the local potters' shops (cf. supra, p. 137 f.). With glass vessels, however, the technical difficulties of production (including the procurement of materials) necessitated their importation from the Eastern centres of production already mentioned. But exports from Italy and provincial glass factories such as Colonia Agrippina = Cologne on the Rhine soon followed. P. V. C. Baur, in *Gerasa*, p. 519, suggests, while pointing out the presence of Syro-Palestinian glass at Cologne, that we should assume travelling glass-makers rather than export. However, the one needs not necessarily exclude the other, for, as regards *unguentaria*, the export from Syria, Palestine and Egypt cannot have quite ceased during the Imperial period, if only because of the origin of the unguents themselves. Only an analysis of the glass-mass could possibly clarify this point.

The great quantity of the various types of pottery bottles found in Palestine is in itself proof enough for stating that Palestine played a leading part in the production and export of the pottery *unguentaria* (including their contents), side by side with Syria and Egypt.

The result so far obtained is simple enough: with a single exception (variant *b*), the piriform *unguentaria* and the corresponding glass types described above belong partly to the Augustan and partly to the post-Augustan epoch. We are therefore dealing with a Late Hellenistic — Early Imperial repertory of types.

The two early specimens of variant *b* (from Alexandria and 'Atlit) are to be considered as early Hellenistic precursors of the piriform bottle-variants *a-d*. How these four variants developed out of the early specimens of *b* in the Late Hellenistic and the early Imperial period, we cannot for the time being say with any certainty.[48] However, in trying to trace this development along general lines, we may consider the Hellenistic origin of the four variants of the piriform bottle as reasonably certain: it is a Hellenistic heritage, most probably of eastern (Alexandrian?) provenance, in (partly local) Augustan formation.

As a pure hypothesis we could imagine the development of the variants (from the Augustan period backwards) schematically as follows: An exact correspondence in shape of pottery and glass bottles of the piriform type seems, as far as I can see, to occur only in variant *c* (e.g. Harding, Plate XX, No. 6 and No. 15). Variant *c* should be obviously derived from the older, purely Hellenistic form *b*. Form *a* seems to have been also dependent on *b* (possibly under the influence of the spindle-bottle; see supra, p. 179); the variant *a* precedes morphologically types *c* and *d*, i.e. it seems to have started shortly before the Augustan period. Finally, variant *d* represents possibly a local (Nabataean) derivation of *b*. In general, even if after much modification, the sequence proposed by Loeschcke (see supra, p. 180), for the *unguentaria* in the West: 'Spindelflasche—birnenförmige Flasche in Ton—birnenförmige Flasche in Glas' holds good in Palestine as well.

Two of the four variants of the piriform pottery bottle (*a* and *b*) are found in the ossuary-tombs of the Jerusalem Jews; however, as the survey has shown, both forms are by no means limited to Jewish tombs; on the contrary, they might be found everywhere in the country, but especially in the Hellenized towns, and also outside Palestine, scattered through the Roman Empire. The progressive Hellenization of Jews during Augustan times is evident in the whole range of household, commercial and funerary pottery.

(To be continued)

[48] Neither with regard to the development inside Palestine nor outside.

As-Sinnabra*

L. A. MAYER

Hebrew University, Jerusalem

For a description of Palestine under Muslim rule, based on Arab sources, we have to rely mainly on the work of three great orientalists, Gildemeister,[1] Le Strange,[2] and Myednikoff.[3] The first two used almost exclusively geographical material, while Myednikoff, who devoted the first volume of his book to the history of Palestine, kept his historical and geographical sources apart, and in his last three volumes — dealing with the historical geography of this country — added very little to Le Strange's work. This separation was an obvious methodical mistake since a great deal of purely geographical material can be found in chronicles or manuals for the use of chancery officials. On the other hand, information about historical events often helps to visualize a site. Consequently — with the assistance of the younger members of the School of Oriental Studies of the Hebrew University[4] — I have begun to collect all the Arabic material, printed and manuscript, without distinguishing between chroniclers, travellers, geographers, or encyclopaedists, with the purpose of collecting as many data as possible about the towns, fortresses and villages in Palestine from the Arab conquest until the downfall of the Mamluks. A comprehensive introduction will include a description of the political, administrative and economic order of Palestine, and all such other aspects of cultural life as cannot be fitted into the topographical framework of the book.

The progress of the work has been greatly slowed down by the second World War, and, now that we have no access to our library on Mt. Scopus, it has ceased

* This article was first published in Hebrew, almost exactly as it is presented here, in *Eretz Israel*, Annual of the Israel Exploration Society, 1, 1951, p. 169 f., dedicated to Professor M. Schwabe on the occasion of his sixtieth anniversary.

[1] Gildemeister, J.: Beiträge zur Palästinakunde aus arabischen Quellen, *Zeitschr. Deutsch. Paläst. Ver.*, 4, 1881, pp.85-92; 6, 1883, pp.1-12; 7, 1884, pp.215-230.

[2] Le Strange, G.: *Palestine under the Moslems*. London, 1890.

[3] Myednikoff, N. A.: *Palestina po arabskim istochnikam*. St. Petersburg, 1897-1903.

[4] They are: Mrs. Gertrud Mélamède, Mr. Uri Ben-Horin, Mr. Alexander Dothan, Mr. Asher Goren, Dr. Uriel Heyd, Mr. Shim'on Landman and Dr. Abraham N. Poliak. I should like to thank them once more for their assistance.

altogether. It may be worth while, however, already at this stage, to publish a specimen of the 500 articles of the planned book, in order to invite criticism. At the same time it may serve as comparison with the work of my predecessors. Le Strange, for instance, describes as-Sinnabra, the subject of this article, on the basis of one passage from Yâqût[6] (quoting also *Marâṣid*, II, p. 168, where it was copied), and two references, one to a "bridge over the Jordan south of the lower end of the Lake of Tiberias"[6] and another to a great bridge "beyond the lower end of the Lake of Tiberias".[7] The sources which he quotes do not call it Jisr as-Sinnabra, but it may—or may not—be the same bridge. In the following lines, the reader will find fifteen Arabic references to the palace or village of as-Sinnabra, and seven to its bridge.

As-Sinnabra,[8] in Hebrew and Aramaic sources צינברי, צנברא and סנברא,[9] Σένναβρις in Josephus,[10] Sane Boria[11] and Casale Sembra[12] of the Crusaders,

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[5] *Op. laud.*, p. 531. [6] *Op. laud.*, p. 52. [7] *Op. laud.*, p. 335.

[8] This is the correct Arabic spelling, as pointed out by W.F. Albright: Contributions to the historical geography of Palestine, *Ann. Amer. Schools Orient. Res.*, 2 & 3, 1921-22 (publ. 1923), p. 36, nn. 22, 24. The form Sinn en-Nabra is first found in H.H. Kitchener's Reports (in *Quart. Stat. Palest. Explor. Fund*, 1878, p. 14): 'From Zerin I sent an expedition to Tiberias to inquire after the name Sinn en-Nabiâ... The name was found to be well known.' Nabiâ here is obviously a printer's error for Nabra. As a result, the name appeared in the same form (Sinn-en-Nâbra) in 1881, in *The Survey of Western Palestine*, Mem. I, p. 370, and also on the map of the Palestine Exploration Fund, and was translated 'the tooth of eminence' (*Arabic and English Name Lists*, p. 134). It was taken over from Kitchener by various scholars, such as K. Furrer: Die Ortschaften am See Genezareth, *Zeitschr. Deutsch. Paläst. Ver.*, 2, 1879, p. 53; E.W.G. Masterman: *Studies in Galilee*, 1909, p. 31; R. Dussaud: *Topographie historique de la Syrie antique et médiévale*, 1927, p. 389, carte I, C. 3, and others. However, some doubts were voiced, even at an early date, for instance A. Frei: Beobachtungen vom See Genezareth, *Zeitschr. Deutsch. Paläst. Ver.*, 9, 1886, p. 141: 'In dieser Gegend müsste Sennabris sich befinden, und man will diesen Hügel Sinn en-Nabra bezeichnen gehört haben. Ich erkundigte mich umsonst nach diesem Namen. Niemand wusste etwas davon.' Saarisalo, *Boundaries*, p. 81, mentions that the site is 'more frequently' called Mallâḥah. The editors of the *Name Lists* were apparently caught in the trap of popular etymology here, as occasionally elsewhere.

In Arabic texts the place is sometimes called 'as-Sannîra' (e.g. Ibn Faḍl Allah, *Masâlik al-Abṣâr*, p. 82, l. 10); or 'as-Sîra' (e.g. Sibṭ ibn al-Jauzî, *Mir'ât az-Zamân*, ed. Jewett, p. 25, l. 2; Ibn 'Asâkir, *at-Ta'rîkh al-Kabîr*, vol. III, pp. 443, l. 19, 444, l. 3; as-Sûyuṭî, *Ḥusn al-Muḥâḍara*, Cairo 1327, vol. I, p. 97, ult.); or 'as-Ṣabra' (e.g. Ibn al-Athîr, vol. V, p. 223, l. 1 f.), and even 'as-Sumaira' (al-Mas'ûdî, *Murûj adh-Dhahab*, vol. V, p. 205, l. 7). All these are obvious printers' errors or mistakes of copyists.

[9] Cf. *Sepher Hayishuv*, I, Jerusalem, 1939, p. 130, s.v.; Avi-Yonah, M.: *Historical Geography of Palestine* (Hebrew), Jerusalem, 1949, p. 127, n.11 (with references to Josephus and some recent studies).

[10] *Bellum Judaicum*, III, 9, 7 (=447); IV, 8, 2 (=455), though the passages quoted have Ἐνναβρις and Γιναβρὶν (ed. Niese). One of these is certainly a scribe's error. In his edition of Josephus in *The Loeb Classical Library*, Thackeray corrects Ἐνναβρις to Σενναβρίς.

[11] Cf. Röhricht, R.: Studien zur mittelalterlichen Geographie und Topographie Syriens, *Zeitschr. Deutsch. Paläst. Ver.*, 10, 1887, p. 234, n.4. [12] R. Röhricht, *Regesta*, No. 983, p. 259. I owe this reference to the kindness of my friend and colleague Dr. J. Prawer.

was "a place in the Jordan district (al-Urdunn), opposite 'Aqabat Afîq (the Pass of Afîq), a distance of three miles from Tiberias".[13] "Mu'âwiya used to spend the winter there".[14] Similarly, "(the caliph) 'Abd al-Malik used to spend the winter in as-Sinnabra which is in the Jordan district. At winter's end, he would camp at al-Jâbiya, and order his companions to camp, and present each with sheep according to his rank. A few days after the beginning of the month of March *(adhâr)*, he was wont to enter Damascus...and when the cold became more severe, he would proceed to as-Sinnabra."[15]

Other caliphs of the Umayyad dynasty made use of this palace at times, and several political events took place here. Thus, the caliph Marwân b. al-Hakam stayed here in the year 64 A.H. (683/4) on his way from Egypt to Damascus, and here various complaints were brought before him.[16] In 65 A.H. "on his return from Egypt" this caliph made his followers "swear the oath of allegiance to his sons 'Abd al-Malik and 'Abd al-Azîz (as his heirs) in as-Sinnabra or in Damascus; and he appointed 'Abd al-Malik as governor of Palestine."[17] Ya'qûbî describes the same event and adds the following details: "When Marwân, on his way from Egypt, reached as-Sinnabra which is in the Jordan district, he learned that Hassân b. Bahdal had sworn an oath of allegiance to 'Amr b. Sa'îd. He had him brought before him and told him: I have learned that you have sworn allegiance to 'Amr b. Sa'îd. He denied it. (Marwân) said to him: Swear an oath of allegiance to 'Abd al-Malik (as heir apparent). And he swore (an oath of allegiance) to 'Abd al-Malik and to 'Abd al-Azîz b. Marwân after him. And Marwân did not leave as-Sinnabra until he died."[18]

According to a tradition "Umayya b. 'Abd Allah b. Khâlid b. Asîd passed away at as-Sinnabra which is in the Jordan district"[19] in the reign of 'Abd al-Malik. In the year 126 A.H. (744) "when the (rebellious) men of Palestine and the Jordan-district scattered, Sulaimân (b. Hishâm, commander of the

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[13] Yâqût, *Mu'jam al-Buldân*, vol. III, p. 419, l. 9 f. [14] *ibid.*, l. 10 f.

[15] Al-Balâdhurî, *Ansâb al-Ashrâf*, ed. Ahlwardt, p. 200, ll. 11-16.

[16] Al-Balâdhurî, *Ansâb al-Ashrâf*, ed. Goitein, vol. V, p. 149, l. 20 f.

[17] Al-Balâdhurî, *Ansâb al-Ashrâf*, ed. Ahlwardt, p. 164, l. 15 - p. 165, l. 1.

[18] *Ta'rîkh*, vol. II, p. 306, ll. 16-20. On p. 307, ll. 4-6, however, al-Ya'qûbî mentions the fact that Marwân died in Damascus, in Ramadân of the year 65 A.H. The original information that Marwân died in as-Sinnabra is also quoted by Ibn 'Asâkir, *at-Ta'rîkh al-Kabîr*, and from there by Ibn Kathîr, *al-Bidâya wa-n-Nihâya*, vol. III, p. 260, l. 14, and as-Suyûtî, *Husn al-Muhâdara*, vol. I, p. 97, ult. These authors are, however, also aware of other traditions. A slightly different version of the above story is told by al-Mas'ûdî, *Murûj adh-Dhahab*, vol. V, p. 205.

[19] Al-Balâdhurî, *Ansâb al-Ashrâf*, ed. Ahlwardt, p. 224, ll. 11-13.

caliph's army) set out until he reached as-Sinnabra. And the people of the Jordan (district) came to him, and swore an oath of allegiance to (the caliph) Yazîd b. al-Walîd... When Sulaimân camped at as-Sinnabra, he sent me (says the narrator, 'Uthmân b. Dâûd) to Yazîd b. al-Walîd".[20]

With the disappearance of the Umayyad dynasty from the historical scene, as-Sinnabra ceased to be a palace. The site was inhabited, however, and the village of as-Sinnabra continues to be mentioned in various sources during the following few centuries.[21] The village is referred to several times in connection with the wars between the Muslims and the Franks. For instance, on the eve of the battle of Hittîn, on the 17th Rabî' the Second 583 A.H. (26 June 1187) "(Salâh ad-dîn) went (from the other side of the Jordan to meet the Crusaders who stood near Sepphoris) and camped that day near the Sea of Galilee in the vicinity of a village called as-Sinnabra".[22] At some date which cannot be definitely established, but which is certainly not later than the Ayyubid period, as-Sinnabra ceased to be occupied, and henceforth only the bridge opposite the village appears in the texts.

This bridge, Jisr as-Sinnabra, seems to have been a well known landmark in the district. Ibn al-Baytâr (died 1248) mentions it in defining the region in which the milfoil *(hazanbal)* grows.[23] Ibn al-Qalânisî[24] refers to the bridge at the beginning of his account of the battle between Tughtakîn of Damascus and Maudûd of Mosul against King Baldwin and the lords of Antioch and of Tripoli, on the 11th Muharram 507 A.H. (28 June 1113), when the Franks "agreed to encamp to westward of the Bridge of as-Sinnabra". Sibt ibn al-Jauzî,[25] in describing the same event, is less precise: "Baldwin gathered together (his army) and camped at the Bridge of as-Sinnabra". Ibn Fadl Allah,[26] in the first half of the 14th century, describes the junction of the northern and southern Jordan, and continues, "and together they reach the Bridge of as-Sinnabra (and then flow) to al-Jisr al-'Âdilî (the Bridge of al-'Âdil) which is below the 'Aqabat Fîq, near ad-Dair al-Aswad (The Black Monastery)". At the beginning of the

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[20] Tabarî, *Annales*, 2nd ser., vol. III, p. 1833, ll. 9 f., 14 f., quoted also by Ibn al-Athîr, vol. V, p. 223, l. 1 f.

[21] Cf. e. g. Yahyâ b. Sa'îd (in *Scriptores Arabici*, ser. III, t. VII, Beyrouth, 1909,) p. 159, l. ult.

[22] Ibn Shaddâd, *Sîrat Salâh ad-dîn*, Cairo, s.d., p. 61, l. 5 f. (in *Recueil des Historiens des Croisades, Hist. Orient.*, Part III, p. 93), quoted also by Abû Shâma, *Kitâb ar-Raudatain*, vol. II, p. 81, l. 1.

[23] *Al-Jâmi' li-mufradât*, Bulâq, 1291 A.H. (1875), part II, p. 20, l. 8 b.

[24] *Dhail Ta'rîkh Dimashq*, p. 185, l. 2 (in H. A. R. Gibb's translation, *The Damascus Chronicle of the Crusades*, p. 134).

[25] *Mir'ât az-Zamân*, ed. Jewett, p. 25, l. 1 f., recorded under the events of the year 505 A.H. (in *Recueil, vol. laud.*, p. 546, *s.a.* 506).

[26] *Masâlik al-Absâr*, p. 82, l. 10.

15th century, the bridge still seems to have been known under this name, for Qalqashandî,[27] when determining the boundaries of the Safad district, quotes Ibn Fadl Allah without any further explanation: "He said in (his book) *at-Ta'rîf:*[28] And its southern boundary is the Jordan Valley (al-Ghaur) at the Bridge of as-Sinnabra beyond Tiberias."

[27] *Subh al-A'shâ*, vol. IV, p. 150, l. 12 f.; *Dau' as-Subh*, p. 305, l. 17.
[28] *Ta'rîf*. Cairo, 1312 A.H., p. 182, l. 13.

Rare and Unpublished Hasmonaean Coins*

A. KINDLER

THE series of Hasmonaean coins lately attributed to John Hyrcanus II (63-40 B. C.) bearing single Greek letters or monograms[1] has already been discussed several times. Madden[2] noted them, although not exactly, and doubted their existence. In 1943 Stein[3] took the matter up again, and in 1947 Sukenik[4] published a hoard containing several coins bearing Greek letters. Up till now, the search for the right interpretation of these letters and monograms met with great difficulties, because of the lack of sufficient specimens. Now Kanael[5] has suggested a solution—the most probable of all hitherto offered—based partly on coins of the author's collection.

The author publishes here the monograms on twenty coins of this series from the 43 specimens in his collection:[6]

Nos. 1—6 and 14—19 probably stand all for A.

Nos. 12 and 13 probably stand both for Π.

Nos. 7—11 and 20 stand all for AΠ.[7]

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* See fig. 1 and Pl. 12B. All the coins reproduced are from the author's collection.

[1] While searching for the letters one should be careful *not* to see in the ribbons of the bows (which are hanging as usual from the middle of the outer ends of the cornucopiae) one of these letters. The letters or monograms are placed in the field to the left or the right of the cornucopiae about halfway between the above mentioned bow and the joint of the cornucopiae. An exception to this is a coin showing an A above the left bow as published by Prof. Sukenik (infra, n. 4).

[2] Madden, F.W.: *Coins of the Jews*, London, 1881, p. 81, who relies also on Cavedoni and Merzbacher.

[3] Stein, H. J.: Hitherto unexplained symbols on the coins of John Hyrcanus, *Numismatic Review*, 1, 1943, pp. 19-21.

[4] Sukenik, E. L.: A hoard of coins of John Hyrcanus, *Jewish Quart. Review*, New Ser., 37, 1947, pp. 281-282.

[5] Kanael, B.: The Greek letters and monograms on the coins of Jehohanan the High Priest, infra, pp. 190-194.

[6] The numbers in the text correspond to the numbers in fig. 1. As the purpose of this publication is the reproduction of the Greek letters and monograms, the author has restricted himself to display only the reverse of the coins, which does in general bear no inscription whatsoever.

[7] The die-engravers of the Jerusalem mint in the Hasmonaean period did not care for the exact execution of the form of the letters. This fact is well known as regards the Hebrew letters and is also evident in the Greek legends of the Hasmonaean coins.

The legend on the obverse of Nos. 1, 2, 6, 8, 14, 18 and 19 reads: יהוחנן הכהן הגדל וחבר היהודים.

The legend on the obverse of Nos. 3, 7, 9—13, and 20 reads: יהוחנן הכהן הגדל וחבר היהודים instead of: יהוחנן הכהן הגדל וחבר היהודים, and the ח has this: ⊓ or this form: ⊓ instead of the usual: ⊟.

The legend on the obverse of Nos. 4, 5 and 15—17 reads: יהוחנן הכהן הגדל ראש חבר היהודים with the title: ראש (=Head [of the Hever]).

A. Letter or monogram on left side			B. Letter or monogram on right side	
1		(probably same die as Narkiss;[8] cf. Pl. 12B.)	14	
2			15	
3			16	
4			17	
5		(Cf. Plate 12B)	18	
6			19	
7		(Cf. Plate 12B)	20	(Cf. Plate 12B)
8		" "		
9		" "		
10		" "		
11		" "		
12				
13				

Fig. 1

[8] Narkiss, M.: *Coins of Palestine*, I, Jerusalem, 1936, Pl. II, No. 5. The author does not mention the fact, that an A occurs on the reverse of this coin.

The Greek Letters and Monograms on the Coins of Jehohanan the High Priest

B. KANAEL

BRONZE coins bearing on their obverse over the inscription: יהוחנן הכהן הגדול וחבר היהודים 'Jehohanan (John) the High Priest and the Hever (Senate or Community) of the Jews', the Greek letter A have long been known,[1] but only in recent years have various similar monograms been noted as appearing on the reverse of such coins.

The first[2] to note the Greek letters on the reverse of the coins was Stein, who published coins bearing the monogram ΛΠ1 and the letters A,Π.[3] Stein's observations were subsequently incorporated by Reifenberg in the second edition of his *Ancient Jewish Coins*.[4] Other coins, bearing the additional letter Δ and the clear monograms ΛΠ2-ΛΠ3 were published by Sukenik.[5] Additional letters and mono-

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[1] Hill, G. F.: *Catalogue of the Greek Coins of Palestine*. The British Museum, London, 1914 (henceforth BMC), Pl. XX, 17-19. Reifenberg, A.: *Ancient Jewish Coins*, 2nd ed., Jerusalem, 1947 (henceforth Reifenberg), Corpus, No. 8. The letter A appears on the obverse of the coins in the formalized shape A1 (see table, p. 194).

[2] See, however, Kindler's suggestion, supra, p. 188, that 'Madden noted them, although not exactly and doubted their existence', which he bases on Madden, F. W.: *Coins of the Jews*, London, 1881, p. 81.

[3] Stein, H. J.: Hitherto unexplained symbols on the coins of John Hyrcanus, *Numismatic Review*, 1, 1943, pp. 19-21. Mr. Stein has been good enough to inform me, that the symbol which had been published as M should be read as ΛΠ1 in our table, p. 194. I take this opportunity of thanking Mr. Stein for his permission to publish this correction. This coin is in the possession of the Museum of the American Numismatic Society. ΛΠ1 is copied from a cast which I owe to S. P. Noe, Chief Curator of this museum. The drawings on the figure accompanying this article include all monograms appearing on the reverse of the coins of Jehohanan the High Priest known to the writer. The drawings are schematic enlargements, and do not pretend to be exact reproductions of the originals. For this purpose enlarged photographic reproductions, like those accompanying Kindler's article (Plate 12 B), are indispensable. The figure, p. 194, was drawn by Mr. N. Gabriely. The following abbreviations are used in the figure:

ANS—The Museum of the American Numismatic Society, New York.
MJA—The Museum of Jewish Antiquities, Hebrew University, Jerusalem.
K—The collection of Mr. A. Kindler, Ramat Gan.
JM—The Jewish Museum, New York.

[4] Reifenberg, *op. cit.* (supra, n. 1), p. 13; Corpus, No. 9 b.

[5] Sukenik, E. L.: A hoard of coins of John Hyrcanus. *Jew. Quart. Rev.*, New Ser., 37, 1946/7, pp. 281-282. I am indebted to Prof. Sukenik for having placed the photographs of these coins at my disposal.

grams are gradually coming to light on coins in private and public collections such as in the collection of the American Numismatic Society,[6] and that of the Jewish Museum, New York.[7] Kindler possesses several coins with additional monograms. In the same collection are found coins bearing on one side the inscription 'Jehohanan the High Priest, Head of the Hever of the Jews', and on the other, Greek letters.[8]

Until recently, all the coins bearing the inscription 'Jehohanan the High Priest' have been ascribed to Hyrcanus I (135-104 B. C.), so that the newly discovered letters and monograms were also attributed to his rule. Madden[9] attempted to connect the letter A on the obverse of the coin with the alliance between Hyrcanus I and Alexander Zebinas, King of Syria; the letter A would then refer to the name Alexander. This theory also appears in later works. It is, however, very improbable: the main reason being that we have yet to find a Seleucid king impressing the coins of a confederate and subordinate ruler with his initials *alone,* instead of his whole name.

Stein has suggested that the letters on the reverse are magisterial initials. In the letter A he proposes to see the initial of Aristobulos, the son of Hyrcanus I, who would have been a magistrate during the lifetime of his father (then the A appears on the reverse). After his father's death, Aristobulos' initial would have moved to the obverse, while he also began at the same time to strike coins in his own name. This last suggestion has already been dismissed by Sukenik, because of the great number of coins with the letter A on the obverse. Sukenik accepts Stein's interpretation of the signs on the reverse as mint marks, without attempting to identify the magistrates. Such an identification was indeed unlikely, as long as these coins were attributed to Hyrcanus I; for in this case we should expect to find such initial on the coins of his successor as well.

In the writer's opinion Jehohanan Hyrcanus I started to issue coins at a later period of his rule[10] and a part of the coins bearing the name of Jehohanan the

[6] Mr. Noe was so kind as to notify me of this previously unknown coin, and to allow its publication. I take this opportunity to thank Mr. Noe for his constant readiness to help on this and numerous other occasions. [7] Mr. H. J. Stein who donated this coin to the Jewish Museum was kind enough to inform me of its existence. I am indebted to Dr. S. S. Kayser, Curator of the Jewish Museum, for a copy of this coin, and for sending me an enlarged photograph of it.

[8] I am grateful to Mr. Kindler for having allowed me to publish drawings of the then unpublished coins in my preliminary article on them in *Bull. Israel Explor. Soc.*, 16, Nos. 3-4, 1952, p. 55. For full drawings and selected photographs see Mr. Kindler's article supra, pp. 188-9.

[9] Madden, *op. cit.* (supra, n. 2), p. 81.

[10] Cf. the writer's article: The beginning of Maccabean coinage, *Israel Explor. Jour.*, 1. 1950-51, p. 170-175.

High Priest should be attributed to his grandson Hyrcanus II, whose Hebrew name was also Jehohanan.[11] Derenbourg tried indeed to prove that the Hebrew name of Hyrcanus II was Jehonathan. It would, however, seem strange to find the Greek name 'Hyrcanus' appearing as an equivalent of the name Jehohanan in the case of the grandfather, and as the equivalent of Jehonathan in the case of the grandson. Moreover, the decrees attributed by the Mishnah (Sotah IX,10; Ma'aser sheni V,15) to 'Jehohanan the High Priest' refer obviously to Hyrcanus II. These decrees concern ritualistic details. It would be surprising to find decrees of Hyrcanus I in the Mishnah, since he turned Saducee. Their spirit is, however, in accord with Hyrcanus' II attempt to prevent Herod and his soldiers from entering Jerusalem because of an apprehension of ritual defilement (*Ant.* XIV, § 285).

The Roman policy as regards the minting of coins in this region during the period of Hyrcanus II has been elucidated in a recent article by Bellinger.[12] His conclusion is that the attitude of the Romans with regard to local coinage, was, from the conquest of Pompey until the Civil Wars, one of 'official non-interference'.[13] It is interesting to note concerning the problem under discussion, that the only way in which the Romans indicated their supremacy was by adding their monograms on certain local issues—thus did Gabinius, Crassus and Cassius. Julius Caesar caused the Caesarean era of 49 B.C. to be struck on some coins. Only at a later time (from about 20 B.C. onwards) did the Romans begin to have their own types issued in Syria.[14]

While the constitution of Judaea was stable until the time of Jannaeus, his rule and the rule of the weak Hyrcanus II were distinguished by frequent upheavals and constitutional changes.

The most important changes which occurred during the reign of Hyrcanus II were: Pompey's reduction of the area of Judaea in 63 B.C.; Gabinius' division of the country into five Synhedriae in 57 B.C.; the abolition of these restrictions, accompanied by a renewed extension of the area of Judaea and the appointment of Hyrcanus as ἐθνάρχης by Julius Caesar in 47 B.C.[15] This last change finds expression, in my opinion, in the inscription 'Jehohanan the High Priest, Head of the Hever of the Jews' which appears on some of his coins.[16]

[11] Derenbourg, J.N.: *Essai sur l'histoire et la géographie de la Palestine d'après les Talmuds et les autres sources rabbiniques: I. Histoire de la Palestine*, Paris, 1867, p. 146-148 (not seen by author).
[12] Bellinger, A.R.: The early coinage of Roman Syria, in: *Studies in Roman Economic and Social History, in honor of Allan Chester Johnson*. Princeton, 1951, p. 58-67. [13] *Id.*, p. 64. [14] *Id.*, p. 65.
[15] *Ant.* XIV, § 191. See also Marcus' note to § 143. [16] BMC, Pl. XX, 16; Reifenberg, No. 7, 11.

These upheavals, as well as the rise of the House of Antipater, can be traced to Roman intervention following Pompey's conquest, in conjunction with the weakness of Hyrcanus.

Throughout the successive upheavals and changes, Antipater continued gradually to strengthen his position until finally he was, in fact, the ruler, and Hyrcanus retained only the title. Even before the arrival of Julius Caesar in 47 B.C., Antipater appears under the title of ἐπιμελητής.[17] In 47 B.C. Caesar nominated him ἐπίτροπος[18] and he retained this post up to the time of his death in 43 B.C. It must be remembered that both these posts were, officially, mainly financial ones,[19] so that it would be natural for the initials of Antipater, in his capacity as chief authority for economic matters, to appear on the coins of Hyrcanus II, the titular ruler.

This is perhaps the place to mention several other possible explanations which occurred to me previously:

(a) That in some cases the letter A on the obverse has been imprinted on the coins towards the end of the reign of Alexandra (Salome)—76-67 B.C. (and perhaps also in that of Aristobulos), when Hyrcanus II was High Priest, and therefore formally, from the point of view of internal politics, head of the state. The letter A would then refer to the actual rulers.

(b) That the letter Π and the monogram ΑΠ referred to Peitholaus, who was ὑποστρατηγός in Jerusalem at the beginning of Gabinius' partition.[20]

Both theories, and especially the first, will bear additional investigation.

It seems, however, most likely that the letters and monograms which appear on these coins are abbreviations of the name Ἀντίπατρος: A, Π are the initials of his name (A being the initial of the whole, and ΑΠ of both parts). The Greek letters are technically crude, their size is only up to about 2x2 mm., and it appears that they were not always properly engraved on the die, so that the letter A often emerges in the form Δ,Λ and the like.

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[17] *Ant.* XIV, §§ 127, 139. [18] *Ant.* XIV, § 144.

[19] For the meaning of ἐπιμελητής see: Schürer, E.: *Geschichte des Jüdischen Volkes*, I, 3rd-4th ed., Leipzig, 1901, p. 343, n. 14; Preisigke, F.: *Fachwörter des öffentlichen Verwaltungsdienstes Ägyptens*, Göttingen, 1915, p.86-87.; Marcus' note on *Ant.* XIV § 127.On the connection of the ἐπιμελητής with coinage cf. Head, B.V.: *Historia Numorum*, 2nd ed., Oxford 1911, pp. lxvii, lxx, and Index F, on p. 934 s. v. Ἐπίτροπος (in Latin: procurator) is chiefly a financial official, cf. Marquardt, J.: *Römische Staatsverwaltung*, I, 2nd ed., Leipzig 1884, p. 555 f.; Schürer, *op. cit.*, p. 456, n. 26; *ibid.*, p. 473 f. Shalit, A.: *The Roman administration in Palestine* (Hebrew), Jerusalem 1947, p. 82.

[20] *Ant.* XIV, § 93.

It is possible that Antipater began by impressing his initials on the reverse of the coins; only at a later date, perhaps in 47 B.C. when he was named ἐπίτροπος, did he begin to impress the letter A on the obverse of the coins, above the inscription 'Jehohanan the High Priest'. At the same time, coins continued to appear bearing the name of Jehohanan without the Greek initials of Antipater.[21]

	ΛΠ1	ΛΠ2	ΛΠ3	ΛΠ4	ΛΠ5	ΛΠ6
Sign						
In Possession of[22]	ANS	MJA	MJA	K	K	K
Number on Plate 12 B				7	10	11

	A1	AΠ1	AΠ2	AΠ3	AΠ4	AΠ5
Sign						
In Possession of[22]		K	ANS	K	K	JM
Number on Plate 12 B		8		9	20	

[21] It would be advisable to investigate once again the coins of 'Jehohanan the High Priest' in public and private collections, in order to elucidate all the letters and monograms which appear on them, and which were not noted before the publication of Mr. Stein's article.

[22] See supra, p. 190, n. 3.

HEBREW BOOKS AND PAPERS

Books

Avizur, S.: *Nahal 'Ayalon* (Wadi Musrara). Tel-Aviv: General Federation of Labour, Cultural Centre, 1952. 115 pp., 22 figs, fold map. (Bibliography, pp. 107-115.)

This handy guide deals in turn with each part of the 'Ayalon basin (in itself a part of the Yarqon river system). The geographical description of each valley and its landscape is followed by short historical and archaeological notes, reaching from the prehistoric period (Nahal Natuf) to the Israel War of Independence (Nahal "Burma"). The author uses to a very large extent the new geographical nomenclature of the Israel Names' Committee (See *Israel Explor. Journ.*, 1, 1950-51. pp. 250/1).

Yaari, A.: *Shluhey 'Eres-Israel* (Emissaries from the Land of Israel). Jerusalem: R. Kook Inst., 1951. XVIII & 947 pp., 28 figs. (Addenda, pp. 837-861, Bibliography, pp. 863-901, Index, pp. 903-947).

The book consists of two parts: Part one (pp. 1-186) represents a synthetical study of the institution as a whole; separate chapters deal with such problems as: who served as emissary, the choice of personnel, the modus of appointments and the appointing authorities, activities, means of propaganda, spiritual influence, the emissaries' share in the search after the Ten Tribes, the messianic movement of Shabbatai Zevi, the Cabbala, the opposition to religious reform, etc., and finally the rising resistance to and abolition of the whole institution of emissaries from the Holy Land. The second and main part gives a history of the various emissaries as far as known, for nineteen centuries; from A.D. 70 to the threshold of the modern era. The relative abundance of source-material is reflected in the space devoted to each period. Chapters 1-3 deal with the period up to the Turkish conquest of Palestine (A.D. 70-1517); chapters 4-6 with the sixteenth and seventeenth centuries; chapters 7-14 with the early 18th century only, chapters 15-21 with the late 18th to about the middle of the 19th century. The various sources, both printed and in MS, are extensively quoted.

Papers

ARCHAEOLOGY

The established chronology of the Beth-Shan Temples is re-examined by B. Maisler in *Bull. Israel Explor. Soc.*, 16, 1951, pp. 14-19. His conclusions are: stratum IX (Mekal and Seti Stelae) B.C. 1300-1175/65; stratum VIII temple-Ramses II; stratum VII and "Migdal"—Merneptah; stratum VI-Ramses III (1175/65-1120). A comparative table gives the relative data of the Beth-Shan, Megiddo, Tell Qasile and Tell Beit Mirsim levels, with their absolute counter-values. The new dating is based on a re-examination by the author of the pottery found on these sites.

J. Kaplan gives a short report on his excavation of an Early Bronze tomb-cave at Tel-Aviv. Besides the characteristic pottery a noteworthy lamp was found, composed of one bowl set within another—apparently the inner bowl contained oil, the outer water which pressed the oil upwards through a connecting hole, thus ensuring an even supply of oil to the wick to the last drop. (*ibid.* pp. 20-13.)

TOPOGRAPHY

The study circle for Historical Geography among Prof. Maisler's students have made a survey tour of the Dan area. The main results were: *Ras Abu Hamid* (1:100.000 map, sheet 9, 140145) — Iron Age, Roman-Arab (= Gibbethon?). *Tell Malat* (137140 — Early Bronze, Middle Bronze II, Early Iron, Persian to Arab. *Kh. Muqanna'* (135132) — Early Iron II, 1, (Philistine), Early Iron II, 2-3, Middle Iron, Persian, Byzantine. *Tell el-Batashi* (141132) Early Iron, Middle Iron, Persian, Hellenistic Byzantine (= Ekron ?). *Kh. Tibna* (144127 — Roman-Byzantine, i.e. not = Timna). (*ibid.*, pp. 47-51.)

Y. Yadin suggests the derivation of "ha-Yahudi" in Samaria ostracon 51 from a place-name *Yahud*, which he identifies with Kh. Yahuda (1:100.000 map, sheet 7, 179188). (*ibid.*, pp. 61-92.)

B. Maisler, using the newly discovered Nimrud Annals of Tiglath-Pileser III, draws attention to the town name *Ka-ash-pu-na* which has been previously read Ra-ash-pu-na and identified with Arsuf = Rish-pon. The text appears now ro refer to another maritime city, situated in Phoenicia, and called Kaspon. (*ibid.*, pp. 70-71.)

M. Avi-Yonah suggests the correction of the controversial Μαρισηνους in Josephus Ant. XIII, 275 to Γερασηνους, i.e. the inhabitants of the Jewish village of Gerasa (Bellum jud. IV, 487) in the Acrabattene. (*ibid.*, pp. 29-31.)

PALAEOGRAPHY

N. H. Tur-Sinai discusses the possibility of a dating of the writing of the Dead Sea scrolls by the use of the different final forms of the letters מנצפ״ך. His conclusions are: (a) the oldest MS, fragments of Leviticus, has a single form for these letters; (b) the youngest group (Isaiah II etc.) agrees with the Masoretic rules, i.e. dates to A.D. 150-200. (c) the middle group (Isaiah I etc.) precedes the second century A.D. (*ibid.*, pp. 5-13.)

NUMISMATICS

B. Kirschner suggests (i) that the circle on the coins of Alexander Yannay represents a carriage-wheel, symbolizing his conquests; (ii) that the first coins of the Roman procurators in Palestine, LΛΓ = year 33, be dated by the Anni Augusti and not the Actian era. (*ibid.*, pp. 56-60.)

CLIMATOLOGY

A particulary valuable recent publication is *M'musa'im 'Aklimi'im Ravshnatiyim. I.* (Climatological Normals, I.) published by the Israel Meteorological Service as Ser. A, Meteorol. Notes, No. 3. Jerusalem, 1952. This publication contains the following tables: Mean monthly and annual rainfall, do. as percentage of annual total, mean number of rainy days; mean maximum, minimum and daily temperatures; mean daily range of temperatures; absolute maximum and minimum temperatures; mean relative humidity, daily evaporation and cloud amount. Rainfall figures are referred to the period 1901-30, those of the other elements to the period 1940-49, with the exception of absolute temperatures for which all data available have been used. A station map and an average rainfall map, both at the scale of 1 : 1.5 million, are attached.

M. Nun in Ruhot ha-Kinneret (The Winds of Lake Tiberias), *Yam*, 65, Nos. 6-8, 1951, published a large amount of non-instrumental wind-data for Lake Ti-

berias for the different seasons. This lake, enclosed by high mountains on the east and west, quite frequently experiences strong descending winds which become dangerous to boats. Velocities of 60-75 km/h are experienced in gusts during the west-wind typical for afternoon-hours in summer, and velocities of gale force have been recorded with south-westerly winds in winter. The most trying and dangerous wind is no doubt the winter east-wind descending as a howling storm onto the eastern part of the lake from the Hauran-plateau. The suddenness of its onset is particulary dangerous, its extreme gustiness and its foehn qualities trying to man and plant alike; the east-shore is exposed to it for a considerable number of days during the winter-season.

J. Braslawsky discusses Sa'arot we-Shitfonot bemifras Elath (Storms and floods in the Bay of Elath), in *ha-Teva' we ha-'Ares*, 9, 1952, pp. 398-405, 423, making use of observational data of the Israel Meteorological Service. Winds of 60-65 km/h are by no means rare and storms of 150 km/h are on record: these high winds are particulary trying as, with ample supply of loose sand available, they develop into veritable sandstorms which reduce visibility to nil. Although the average annual rainfall is 20 mm., deviations from average are very large at Elath as in every typical desert-climate. In 1944/45 43.0 mm. were recorded and in 1949/50 41.9. On 31.12.1944, 29 mm. were recorded, and 'Aqaba just at the opposite side of the bay recorded even over 50 mm. on that day. Much more destructive than the local downpours are the sudden floods which, coming down the valleys from the high interior, sweep the shores of the head of the Gulf of Elath. They repeatedly caused severe damage to the township of 'Aqaba, as e.g. in 1182 when it was virtually destroyed by a flood.

REVIEWS

Matthews, C.D.: *Palestine—Mohammedan Holy Land;* with a Foreword by Julian Obermann. Yale Oriental Series: Researches. Vol. XXIV. New Haven: Yale University Press, 1949. XXX & 176 pp.

The book contains a popular translation—as the author himself calls it (Introduction, pp. XI, XVI)—of two Arabic treatises published by him in *Journ. Palest. Orient. Soc.*, 15, 1935, pp. 51-87, and *ibid.*, 17, 1937, pp. 114-137, 149-208.[1]

The first treatise is Burhân al-Dîn ibn al-Firkâh al-Fazârî's: *Kitâb Bâ'ith al-Nufûs ilâ Ziyârat al-Quds al-Mahrûs*, compiled from two sources: Behâ al-Dîn ibn 'Asâkir's: *al-Jâmi' al-Mustaqsâ* (see Brokkelmann: *GAL* SI pp. 567-8) and Abû al-Ma'âlî al-Mushrif's: *Fadâil al-Bait al-*

[1] Matthews (Introd., p. XVI) himself erroneously refers to vol. 16, no. 4 and vol. 17, no. 1.—In 1365/1946, Ahmad al-Khâlidî published in Jerusalem a fragment of another treatise on the same subject, namely, Jamâl al-Dîn (Ahmad) al-Maqdisî's: *Muthîr al-Gharâm* (about 749/1350), but this fact was unknown to M.; see Introd., p. XXIII, n. 6.

Muqaddas (see *ibid.*, pp. 567). Matthews, p. 139, no. 8, reiterates the view expressed by him in *Journ. Palest. Orient. Soc.*, 14, p. 286, that both books are lost. He seems to be unaware that a manuscript of Abû al-Ma'âlî's work is described by Seybold: *Die Arabischen Handschriften der Universitätsbibliothek zu Tübingen*, I, 1907, pp. 62 ff., and that a photocopy thereof exists—according to Brockelmann, *l.c.*—at the Government Library in Cairo. Recourse to that MS might have been of use in the editing and translating.

The second treatise is Abû al-Fidâ's Ishâq al-Tadmûrî's: *Kitâb Muthîr al-Gharâm li-Ziyârat al-Khalîl.* It contains mainly a biography of Abraham in the hagiographic manner of the sacred legends. Abû al-Fidâ himself frequently cites as his source al-Tha'labî, the well-known author of the Stories of the Prophets, *Qisas al-Anbiyâ.*

There is a fundamental difference between the two works. Whereas the first centres upon Jerusalem and praises its merits in the traditional manner, the second mentions that city as little as possible and locates all important legends in Mecca or Hebron. According to it, Abraham would seem never to have been in Jerusalem (comp. text, *Journ. Palest. Orient. Soc.*, 17, pp. 134-7; translation pp. 64-67) and the offering of Isaac—according to the sources which maintain that *he* was the victim—took place two miles outside Jerusalem (text p. 163; transl. p. 84). Even more remarkable is chap. XIX (text pp. 192-195; transl. pp. 118-121): some important features usually associated with Jerusalem (the performance of a *ziyâra* instead of the *hajj* to Mecca, efficacy of prayers, remission of sins) are here associated with Hebron, others, the Heavenly Temple, the Navel of the World, the Flood etc. (chap. VI, text p. 155-158, transl. pp. 75-78), with Mecca.

Matthews' translation is undoubtedly in itself a meritorious undertaking. The general reader, who may be unacquainted with this literature (there are no other works in English available to him, since Guy Le Strange's: *Palestine under the Moslems*, 1890, is very rare), can acquire a knowledge of certain Muslim beliefs concerning Jerusalem and Hebron. A scholar who knows the corresponding Jewish and Christian beliefs, may perceive the relations between the three versions. The translation is in Biblical style and, as far as I have checked it, correct.

But certain reservations must be made concerning the Introduction, as well as the *popular* notes (see note 9 on p. 140) and glossary which follow the translation. Prof. Obermann writes in his Foreword: 'It (the book) endeavours to appraise their (Jerusalem's and Hebron's) intrinsic significance in terms of Jewish-Christian-Moslem interrelations' (p. V). If so—even if the author intended to give a *popular* book (which is definitely out of place in a *Research* series)—he should have been more careful in his explanations and comments. It was his duty as a conscientious scholar to refer the reader to the sources on which the books he translated were based, and to make it quite clear that the material presented in them offered not dogmas or teachings which the faithful Muslim was required to believe, but legends and sayings with which late authors had juggled according to their local sentiments and aims. How else can

the references to a substitute *ḥajj* to Jerusalem or even to Hebron be squared with the fact that the official *fiqh* literature knows nothing of such substitutes? It is surprising to read in the Introduction, p. XXII, of 'the great pilgrimage to Mecca and Medina' and a lesser one to Palestine, when we know positively that even the *ziyâra* to Mohammed's tomb in Medina is not obligatory according to the *shar'* (comp. *al-Fiqh 'alâ Madhâhib al-Arba'a, qism al-'ibâdât,* pp. 512 ff.; p. 590).

Islam knows many holy cities and pious *ziyârât,* but *only* the Hijâz is its Holy Land. It would have been only fair to point out that Mohammed's nocturnal journey to Jerusalem and his ascent from there to heaven are not mentioned in the Koran (comp. note 4 on p. 139), that Jerusalem is not mentioned in it at all and Palestine only once (*Sura* V, 21). There is no unanimity even as to the place of the Last Judgment and the *ṣirât,* which are dogmas of Islam (see Wensinck: *The Muslim Creed,* pp. 119, 130). Bukhârî *Ṣaḥîḥ* IX, p. 229, para. 65; p. 233, para. 66, makes no reference to Jerusalem in that connection, nor does *Sura* XXXVII, 23 (where the *ṣirât* is mentioned).

On the evidence of the Koran, the *ḥadîth* and the *fiqh,* we may safely say that the opinion cited by Ibn al-Firkâḥ regarding him 'who believes that one should perform the circuit of the Holy Places in Jerusalem, and him who does not', namely, that 'every man doth about it as he wisheth' (text p. 73; transl. p. 26), applies, *mutatis mutandis,* to all beliefs connected with the sacredness of Palestine to Muslims. In fact, we have to do here with ancient local—Jewish and Christian—traditions, which have never been fully, or even partially, adopted by Islam and which are known in Arabic literature as *Isrâ'îliyât.*[2]

Matthews seems to have a very scanty knowledge of the relevant Jewish material, his only source being here L. Ginsberg's: *The Legends of the Jews* (n. 11 on p. 140). The treatises give him no opportunity to show his knowledge of Christian hagiographic literature. The Jewish literature on pilgrimages to Palestine is likewise never mentioned by him. And it may well be doubted whether he has read all the Christian books he quotes on p XXVI. He cites E. Carmoly: *Itinéraires de la Terre Sainte* (Brussels, 1849), among the Christian sources, when one glance at the title-page or the contents would have told him that it is a translation of accounts of Jewish travellers.

Even more serious is the suspicion that the author is not particularly familiar with Moslem legends. With charming naivety he confesses (p. XII, n. 1) that he learnt of the existence of Eisenberg's edition of al-Kisâ'î: *Qiṣaṣ al-Anbiyâ* (Leyden 1922-1923) only in 1948. It should be remembered that this is one of the *two* published versions of those legends,[3] that it is cited in the *E. I.* almost everywhere where Biblical personages are mentioned and that it is listed by Brockelmann: *GAL*

[2] A detailed study of these legends and the sources of Moslem traditions on Jerusalem, written six years ago by the present reviewer, will appear in a memorial volume for the late Polish Orientalist J. Kowalski, to be published in the series *Rocznik Orientalistyczny,* Kraków.

[3] The as yet unpublished ones include that of Abû Rifâ'a 'Umâra Ibn Wathîma (*cod. Borg.* 165, not mentioned by Brockelmann: *GAL* SI 217), which is the subject of a Rome thesis (1927) by I. Ben-Dor.

SI, 592, (ed. 1937).[4] His knowledge of Tha'labî, whom he would like to translate into English (p. XII, n. 1), and of other older sources is not very thorough, either. Here are some instances, which could be multiplied at will:

The legend of the 'Great Fish' (Leviathan), translation p. 31 and n. 91, occurs in Tha'l.: *Qiṣaṣ* (ed. Cairo 1356 H) p. 4, Kisâ'î, p. 10 and *Ḥilyat al-Auliyâ*, VI, p. 8.

P. 32 and n. 94: The story of King David the maker of mail-coats is very old, occuring already in pre-Islamic poetry; comp. Hirschberg: *Der Diwân des as-Samau'al*, p. 60; id.: *Jüdische und Christliche Lehren*, p. 62, where many sources are quoted.

P. 37 n. 112: On the 'two angels of the tomb' see M. Wolff: *Muhammedanische Eschatologie*, text p. 40; transl. p. 71.

Abû al-Fidâ (text p. 118, transl. p. 45) states that according to Tha'l. Noah lived 950 years before the Flood and 350 years thereafter. The first figure accords with the Koran (XXIX, 13), the second with Gen. IX, 29. But in fact Tha'l.: *Qiṣaṣ*, p. 50, in the name of the traditionist 'Aun b. Shaddâd, says the contrary: 350 years before the Flood, 950 years thereafter. Besides, both Tha'l. *l. c.* and Kisâ'î, p. 99 know 950 years as the biblical figure of Noah's whole lifetime. See also Hirschberg: *Israel in Arabia* (Hebrew), p. 228, n. 161.

The story of the gnat that got into Nimrod's brain (text p. 132, transl. p. 61; and comp. Tha'l., p. 81) is a variant of a similar legend about Titus; comp.: *Babli Gittin* 56[b] and parallel sources.

Page 110 n. 78: For Ibn Ḥauqal see *BGA* II p. 113; Istakhrî: *BGA* I p. 57.

The glossary, too, lacks in accuracy. To define the *miḥrâb* as 'practically equivalent to *qiblah*' is like defining the needle of the compass as practically equivalent to the North Pole.

Rak'ah is not 'the entire ritual of prayer', but only one position (see Yuynboll, *Handbuch des islamischen Gesetzes*, pp. 76 ff.).

The definition of the *ṣirât* as the bridge which 'is to be set up from the eastern wall of the Temple area in Jerusalem across the Valley of Kidron or Jehoshaphat, to the Mount of Olives' may lead to a misconception as to where the Last Judgment is expected to be held. That locality is the Temple area; see for instance, Muslim: *Ṣaḥîḥ* III, p. 20-21; Wensinck: *Muslim Creed*, p. 119, 130. The *ṣirât* is completely unknown to Jewish and Christian sources; see R. Leszynsky: *Mohammedanische Traditionen über das Jüngste Gericht*, p. 33 ff.; Wolff, *op. cit.*, p. 82 f.

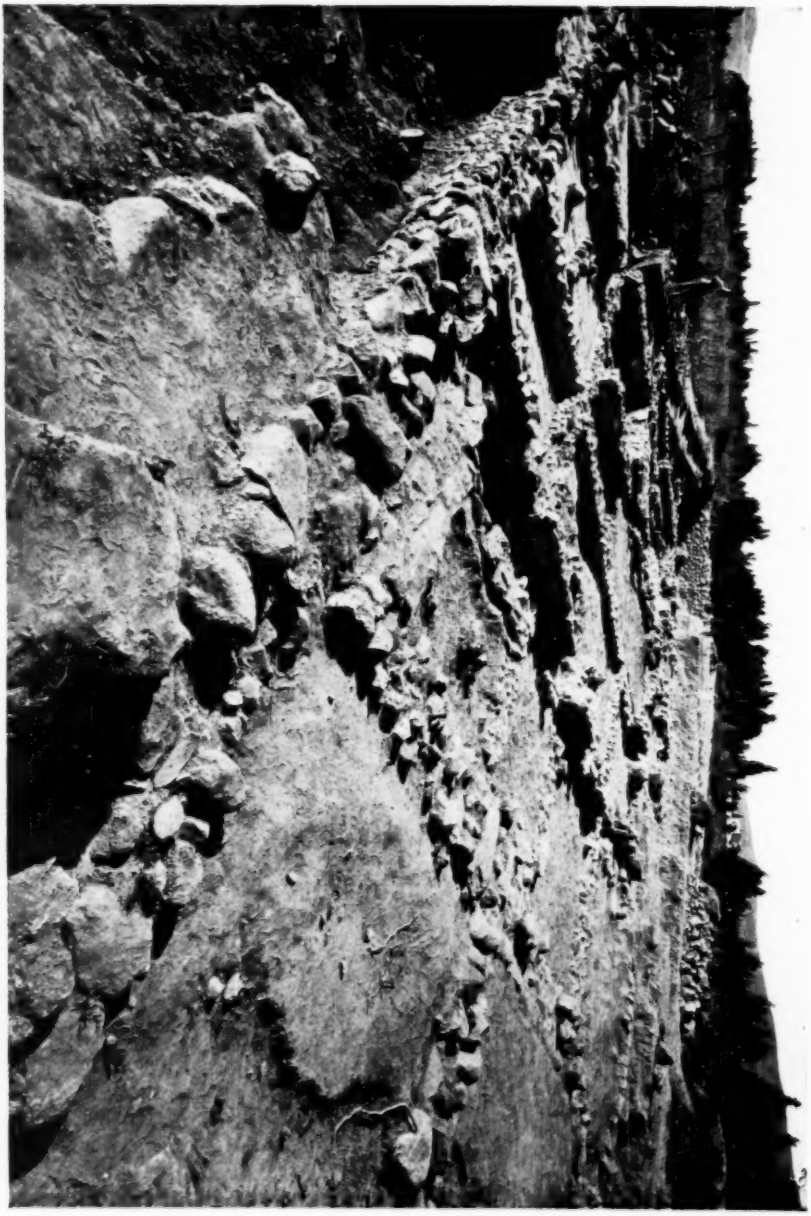
To sum up: the author set out to show that Palestine is a Muslim holy land. Neither his introduction, nor his commentary, nor the contents of the two treatises prove this thesis; the scientific worth of his book falls short of the standard of the Yale Oriental Series.

J. W. HIRSCHBERG

[4] It should be remarked that I could not find the opinions expressly attributed to al-Kisâ'î by Abû al-Fidâ (text chap. III, p. 128, and chap. VI, p. 156, transl. pp. 57 and 76) in the edited version of al-Kisâ'î's *Qiṣaṣ*, comp. *l. c.*, pp. 138 and 145.

Cut showing brick- and stone-walls.

PLATE 10



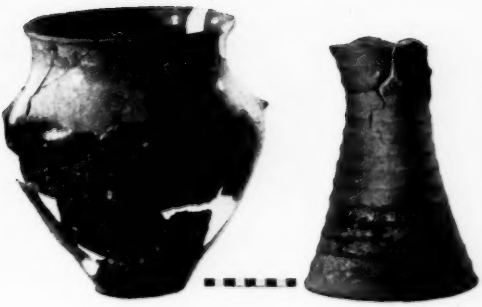
Hellenistic foundations.

A, C, D: Kh. Kerak Ware.

B: Painted jar with criss-cross pattern.

A

B



C D

a *b* *c* *d*

A: Piriform Bottles, Variants *a*—*d*.

Provenance: *a*—Acre, *b*—Ramat Rahel, *c*—Petra, *d*—'Amman.

POTTERY FROM OSSUARY-TOMBS

B—1:1.9.

RARE HASMONAEAN COINS

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*VOLUME 2 * NUMBER 3*

1952

PRINTED IN ISRAEL

HADASSAH APPRENTICE SCHOOL OF PRINTING, JERUSALEM